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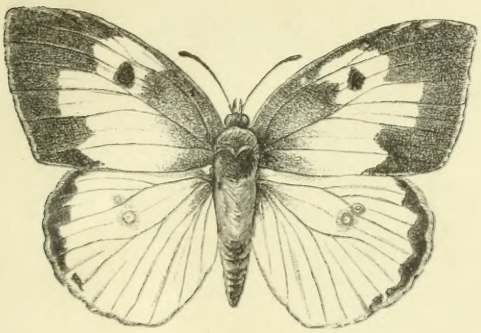

MEGANOSTOMA CÆSONIA.

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HENRY HERBERT LYMAN, M. A

PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO, 1897-9.

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HENRY HERBERT LYMAN, M. A.

We have much pleasure in presenting to our readers, at the beginning of a new volume of the CANADIAN ENTOMOLOGIST, an excellent portrait of Mr. HENRY HERBERT LYMAN, of Montreal, who has recently retired from the Presidency of the Entomological Society of Ontario. He was born at Montreal, on the 21st of December, 1854, and received his early education at the West End Academy and the High School, winning at the latter the Davidson medal. At McGill University, to which he proceeded, he took the degree of B. A. (Logan medalist in Geology and Natural Sciences) in 1876, and M. A. in 1880.

In 1877 he entered the firm of Lymans, Clare & Co., wholesale druggists, in Montreal, which two years later assumed the present name of Lyman, Sons & Co. He is now senior partner and also president of the Lyman Bros. & Co. (Limited), Toronto. These business houses are widely known throughout the Dominion, and have always been distinguished for their upright dealing, energy and enterprise.

Mr. Lyman has also been an active member of the volunteer force; he joined the 5th Battalion, now the Royal Scots of Canada, in 1877, as an Ensign, and rose to be Major in 1885, with which rank he retired in 1891. He has further manifested his loyalty by becoming a Fellow of the Royal Colonial Institute, and a member of the Council of the British Empire League.

When less than eight years old he began to take an interest in insects, and to observe their ways, and when only twelve he started to form

a collection of Lepidoptera, which has now become one of the finest in Canada. His first printed observations on insects appeared in the 6th volume of this magazine (1874), and he has since contributed to seventeen of the succeeding volumes; he has also furnished useful and interesting papers to several of the Annual Reports of the Society. The value of his scientific work and attainments has been widely recognized. Since 1891 he has been a member of the Editing Committee of this magazine; in 1895 and '96 he was elected Vice-President of the Society, and in 1897 he became President. He held this highest place in the Society for two years, to the great satisfaction of the members, and retired at the last annual meeting. He is also a Vice-President of the Natural History Society of Montreal, and member of a number of Scientific Societies in the United States. For the last thirteen years he has been President of the Montreal Branch of the Entomological Society of Ontario, and has done more than anyone else to keep alive the enthusiasm of the members, and to encourage all who show any interest in the subject to persevere in the study. During all these years nearly all the monthly meetings have been held at his home, and the members have greatly enjoyed his generous hospitality.

Mr. Lyman is a notable example of what a busy man can do. Though engrossed all day long with the duties and cares of a very extensive business, which demands, more, perhaps, than any other, a close attention to innumerable details, he yet finds time not only for the pleasures of an energetic collector of insects, but also for the performance of much careful and conscientious scientific work. His published papers are valuable contributions to science, being always characterized by thorough accuracy of statement, and showing the results of painstaking and long-continued research.

NOTE ON DANAIS ARCHIPPUS, Fab.

On the 30th October last I found, on the grounds of the Central Experimental Farm, a chrysalis of Danais Archippus, Fab. This was attached to a twig of maple, about seven feet from the ground, and was quite green. When I had kept it in the office for two days it began to darken, and on the 4th November the butterfly emerged, but in a crippled condition. This occurrence is rather interesting, and the question arises, If the chrysalis had been allowed to remain on the tree, would it have given the butterfly this autumn or not until next spring? It would be interesting to know if any other person has observed the chrysalis of this butterfly so late in the season as the above, and with what results. Arthur Gibson, Central Experimental Farm, Ottawa.

DESCRIPTIONS OF THREE NEW SPECIES OF COCCIDÆ FROM BRAZIL.

BY ADOLPH HEMPEL, SAO PAULO, BRAZIL.

Subfamily Coccinæ.

Capulinia crateraformis, n. sp.

The ♀ makes a small crater-shaped gall in the bark of the limbs and twigs. This gall is about 1.5 mm. high, and consists of an outer circular ring from 1 mm. to 1.5 mm. in diameter, and a small cone within, which can readily be removed. The cavity inhabited by the insect is smooth and is lined with a white powder. The adult ♀ is small, oval in outline, pink, and is dusted with a white powdery secretion. Boiled in a solution of KOH it becomes colourless. Size, after boiling: length, .96 mm.; width, .73 mm.

Antennæ small, variable, usually of five joints, although joint 3 sometimes divides so that the antenna becomes six-jointed. Length, 97 micromillimetres. Approximate formula 31(24)5. Average length of joints in micromillimetres: (1), 27; (2), 13; (3), 35; (4), 13; (5), 9. The last joint bears a terminal brush of coarse hairs. First and second pairs of legs entirely wanting. Third pair of legs atrophied: without any visible articulations; and not ending in a claw. The legs are usually placed so near the posterior end of the body that half the length extends beyond the margin. Length, .177 mm. Rostrum large and well developed. Mentum apparently dimerous. Rostral loop long, coiled upon itself, and extending to the second pair of spiracles. The spiracles are chitinous and well developed, and from one to four small round spinnerets are grouped around each one. The derm is transversely wrinkled. The abdomen is segmented and ends in two short setæ. The genital aperture is guarded by four small spines. Around the margin of the body, and on the dorsal surface, there are scattered small spinelike hairs.

Male and larva not observed.

Hab.—Sao Joao d'El Rei, State of Minas Geraes, Brazil. On the limbs and twigs of *Eugenia jaboticaba*. Mr. Alvaro da Silveira collected this species, and writes that it causes much damage to this fruit tree. From a foot-note by Prof. T. D. A. Cockerell, in the "Journal of the New York Entomological Society," Vol. VI., Sept., 1898, pp. 174 and 175, it is apparent that this species also occurs in the State of Sao Paulo. In speaking of *C. jaboticabæ*, Dr. Prof. Cockerell says, "Dr. Noack has also sent me some specimens *in situ*, collected by Dr. Campos Novaes at

Itatiba, State of Sao Paulo, and I find they live in little crater-shaped galls. The females have the antennæ with 5 or 6 segments." It is quite evident that the species which Prof. Cockerell examined was not *C. jaboticabæ*, but *C. crateraformis*.

The species of *Capulinia* may be readily separated by the following tabulated characters. Unfortunately, I have no material of *C. Sallei*, and the characters here given are taken from Sign. and Townsend & Cockerell.

C. jaboticabæ.	*C. crateraformis.*	*C. Sallei.*
Length, 2.40 mm.	Length, .96 mm.	Length, 1.50 to 1.67 mm.
Antennæ of 4 to 5 joints.	Antennæ of 5 to 6 joints.	Antennæ a short tubercle.
Length of antennæ, 75 micromillimetres.	Length of antennæ, 97 micromillimetres.	
First and second pairs of legs entirely wanting.	First and second pairs of legs entirely wanting.	First and second pairs of legs represented by a sharp conical tubercle.
Last pair of legs articulated, and without a claw.	Last pair of legs not articulated and without a claw.	Last pair of legs not articulated, terminating in a claw.
Last pair of legs .302 mm. long.	Last pair of legs, .177 mm. long.	
Last pair of legs removed from the posterior margin.	Last pair of legs very near the posterior margin.	Last pair of legs removed from the posterior margin.
The female makes neither a gall nor a definite sac; the eggs being deposited in a fluffy mass of white cotton.	The female makes a small crater-shaped gall.	The female covers itself with a white cottony sac bearing a single long filament from the end.
18 to 35 spinnerets around each spiracle.	1 to 4 spinnerets around each spiracle.	
Hairs on margin and body long.	Hairs on margin and body short.	

Subfamily Lecaniinæ.

Lecanium Silveirai, n sp.

♀ sub-circular to oval in outline, light red in colour. Dorsum convex, shiny, with a slight longitudinal median ridge; derm hard, depressed around the anal plates, and covered with a very thin layer of waxy secretion. Anal cleft short, with the sides contiguous. Arising on the ventral surface and extending up each side, are two lines of white powdery secretion. When removed from its resting place, it leaves a round patch of thin white wax behind. The specimens examined were 5 mm. long, 3.5 mm. wide, and 2 mm. high. It is probable that these specimens were immature, as none contained eggs or larvæ.

Boiled in a solution of KOH, the derm becomes soft and transparent, being chitinized only around the anal plates. Antennæ and legs wanting. Rostrum large and well developed, situated between the first pair of spiracles. Rostral loop long, extending to the anal plates. Anal ring apparently with ten hairs. Anal plates small, with the lateral angle rounded, and the antero-lateral side longer than the postero-lateral. The margin has two horseshoe-shaped incisions on each side, opposite the spiracles, in which the derm is thickened and chitinized. The spiracles are situated very near to these incisions, and are connected with them by many small round spinnerets. The tracheæ are large and many-branched. Around the margin of the body there are 2 or 3 rows of small hairs, each one arising from a small tubercle. The entire derm on both surfaces is covered with numerous large, round, nipple-shaped glands. These are dark brown with a light centre. Interspersed among these glands are a few hairs, and numerous small slender filamentous glands.

Hab.—Sete Lagoas and Diamantina, State of Minas Geraes. On the roots of grapevines, where it causes much damage. The specimens were collected by Mr. Alvaro da Silveira, on the roots of the Isabel grape. Mr. Amandio Sobral and Dr. Compas da Paz have known a disease for several years which they attribute to this insect. This species is of special interest to agriculturists and economic entomologists; and will be difficult to combat, because of its subterraneous habits.

Lecanium obscurum, n. sp.

♀ scale of young and half-grown individuals, green; the scale becomes darker with age, and is black in the old specimens. Shape elliptical, dorsum convex rounded, shiny, with minute patches of waxy secretion; the derm is finely granular, and wrinkled at the sides. On the

ventral surface there are two converging white lines on each side. Anal cleft .94 mm. long; sides contiguous. The largest specimens are 4.5 mm. long, 3 mm. wide, and 2 mm. high.

Boiled in a solution of KOH, it colours the liquid greenish. The derm is chitinized and retains a dark colour. It is not reticulated, but pitted with minute round hyaline spots. Antennæ of seven joints, all of which, except joint 3, bear hairs. Length 350–361 mm. Approximate formula 423 (17) (56), or 472 (13) (56). The antennæ are variable, but in all the specimens examined, joint 4 was the longest and joints 5 and 6 the shortest. Length of joints in μ: (1), 49; (2), 58–62; (3), 49–62; (4), 80–89; (5), 22–29; (6), 27–29; (7), 49-62. Legs ordinary; the coxa of the first pair of legs, with a short apical hair and several short spines; trochanter with the long side convex and bearing a long hair; the articulation between the tibia and tarsus is indistinct; tarsus with a constriction near the middle; claw short; digitules twice the length of claw, large, of equal size, bulbous at base, and broad and flat at the end; tarsal digitules slender, with the ends slightly expanded. Length of joints of first pair of legs, in μ: coxa, 80; femur with trochanter, 200; tibia, 120; tarsus with claw, 111; tarsus without claw, 89. The tarsi of the other legs are not constricted. Mouth-parts well developed, placed just posterior of the first pair of legs. Rostral loop short, not extending to the second pair of legs. Anal ring with ten hairs. Anal plates small; the outer angle rounded, the two outer sides nearly equal, the postero-lateral side being convex and just a trifle shorter than the antero-lateral. Around the lateral margin there is a simple row of small hairs placed wide apart.

A scale small, plain, white, very frail, composed of 7 lateral and 2 dorsal plates. General shape elliptical, the posterior part slightly narrower than the anterior; dorsum convex. Length, 1.355 mm.; width, .830 mm. Found on the branches and on the under side of the leaves.

Larva, just hatched, yellowish green in colour, oval in outline, with the posterior end of the abdomen slightly acuminate and ending in two long setæ. Eyes dark brown. Margin of body serrated and bearing a few short hairs. There are two groups of stigmatal spines on each side, each composed of two very short and one long club-shaped spines. Antennæ six-jointed, joints 3 and 6 about equal in length. Legs ordinary; claw long, tip well curved and slightly notched; the two

digitules are of unequal size, one being small and fine, with the end but slightly expanded ; the other larger, with the end flat and widely expanded. Tarsal digitules also of unequal size, one being longer and thicker than the other. Rostral loop long, folded upon itself and extending to the anal plates. Length, .335 mm.

Hab.—Ypiranga, State of Sao Paulo. Abundant on branches of *Maytenus*, sp.

THE NEURATION OF ARGYNNIS.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

In my examination of the types indicated by Mr. Scudder I have been quite unable to separate *Acidalia niphe*, Scudd., Gen. 101, from the type of Argynnis. This latter type, *A. aglaia*, L., is characterized by the second radial branch of primaries running so close to the main vein, for a distance beyond the median cell, as to form a minute false accessory cell above the angle of the radius which the crossvein joins. Since this, as well as all other features, are repeated in the wing of *niphe*, I conclude the genus *Acidalia* of Hübner, as founded on this species, must be dropped. Another type, *Dryas paphia*, can hardly be retained as distinct from *Argynnis* from the neuration. The only difference is, that the second radial branch, in running propinquitous, leaves the main vein at somewhat before the point chosen in *aglaia* and *niphe*. Indubitably *paphia* is a species belonging to the same phylogenetic group, a trifle isolated. On the other hand, neither *Issoria lathonia* nor *Brenthis hecate* share the character of the appressed second radial branch of *Argynnis* and should be separated from this genus. The differences in the neuration between *Issoria* and *Brenthis* are very small and comparative ; in both the second radial branch is not appressed and leaves the main vein above the median cell before the point of juncture of the crossvein. The point of departure in *Issoria* is a little outwardly removed and the propinquity is so great that one can see that it requires but little to make the branch decumbent. *Issoria* differs further by the angulate papery wings and by the fact that the crossvein on hind wings is but a faint scar between second median branch and cubitus. In *Brenthis* the crossvein is as in *Argynnis*, a rather strong scar, and joins inferiorly the third median branch ; whereas in *Issoria* the point of juncture is opposite the first cubital branch. It is a small distinction, but it reveals the fact that in *Issoria* the breaking up of the median series has progressed further. A parallel difference, more widely expressed, separates the two series of the Satyrids.

I leave out of this series the generic types of *Melitæa*, which are more specialized by the entire disappearance of the crossvein between

second median branch and cubitus. This feature is shared by *Phyciodes*, which differs by its frailer wings. In all these types of the *Melitæa* series, the second radial branch has passed the point of juncture of the crossvein and arises from the radius at a point near where the appressed branch leaves the main vein in *Argynnis*. Thus the *Melitæa* series is more specialized than the *Argynnis* series, in which the second branch leaves the radius before the crossvein. The genera, except *Phyciodes*, separated by Mr. Scudder from *Melitæa*—*i. e.*, *Lemonias*, *Euphydryas*—are all invalid from the neuration and texture of the wing.

There remains to discuss the genus *Euptoieta*. This is a specialized type, as shown by the passage of the second radial branch beyond the cell and by the open cell of secondaries. It seems to lead to *Agraulis vanillæ*, *Colænis julia* and *Dione juno*, in which the first radial branch has followed suit and the "long-wing" butterfly type is assumed. I differ from authors in considering these as Nymphalid or Argynnid types and not as related to the Limnads (*Anosia menippe*, etc.), and the "long-wing" type of *Heliconius*, in which latter the residuary features of primaries are quite apparent and the cells on both wings are closed.

Butterfly Lists.—A puzzled cofrespondent, who has been collecting and studying the butterflies of his own region of country for a score of years, has begun the preparation of a catalogue. At the outset he finds himself confronted with the difficult question as to what order he shall adopt in the arrangement of families and genera. He writes as follows: "I learned the sequence of genera, etc., from Mr. W. H. Edwards' plan, but I notice that every later author makes a plan of his own as to which genus precedes or follows. Now, probably no two men would exactly agree as to the sequence of genera, etc., but ought not all to agree as closely as possibly, to avoid confusion, and not to place stumbling-blocks in the way of the learner?". . . . "Also, as to the division of one genus into several, there is a similar difficulty. For instance, Mr. Edwards' genus Pamphila contained over eighty species; Dr Holland divides it into several genera, yet I doubt if any average Lepidopterist can separate the species according to Holland. Of what use, then, is the division, especially to a beginner? Simply, it is confusion." . . . . "We should have a law, written or unwritten, forbidding any change either in the alteration of old names, or the addition of new ones, without the approval of a committee of competent men."

Our correspondent will assuredly have a large number of sympathizers. Every entomologist groans over the incessant changes in nomenclature that are being made. Some, no doubt, are justifiable and necessary, but very many are not and have soon to give way to others. It is high time that an "Entomologists' Union" should be formed to settle such questions as these, as urged by Mr. Lyman in his Presidential address of 1898.

BIBLIOGRAPHY OF MASSACHUSETTS COCCIDÆ — SUPPLEMENTARY TO CONTRIBUTIONS TO THE KNOWLEDGE OF MASSACHUSETTS COCCIDÆ.

BY GEO. B. KING, LAWRENCE, MASS.

The object of the present list is to bring together all the published records found by me to treat of, or give any reference to, Coccids known to inhabit Massachusetts up to August, 1899. Since then others have appeared and will be published when sufficient material is collected.

Cockerell, Theo. D. A., 1893.—Insect Life, Vol. VI., p. 103, he lists *Finnaspis pandani*, Comst., from Mass. under glass.

Cockerell, T. D. A., 1895.—Insect Life, Vol. VII., p. 43, is a note on *Chionaspis spartinæ*, Comst., found at Woods Holl, Mass.

Cockerell, T. D. A., 1896.—Canadian Entomologist, Vol. XXVIII., pp. 222–224, he describes as new sp. *Ripersia Kingii*, *R. lasii* and *R. flaveola*, from ant-nests in Mass.

Cockerell, T. D. A., 1897.—Science Gossip, Vol. III., n. s., pp. 239–241, notes on all the known ant-nest coccids, and *Dactylopius Kingii* is described from Mass.

Cockerell, T. D. A., 1897.—Part L. of Bul. U. S. Nat. Muse., No. 39, p. 5, mention is made of the success of the writer collecting ant-nest species of coccids in Mass.

Cockerell, T. D. A., 1897.—Bul. No. 6, Tec. Ser. U. S. Dep. Agr., Div. of Entom., Aspidiotus (Chrysomphalus) smilacis, Comst., is recorded from Massachusetts.

Cockerell, T. D. A., 1898.—Ann. and Mag. Nat. Hist., Vol. II., sr. 7, pp. 323 and 330, *Aspidiotus Fernaldi*, *Lecanium Kingii* and *Kermes Kingii* are described from Mass., with a note of the occurrence of *Eriococcus quercus*, Comst.: *E. azaleæ*, Comst., and *Kermes pubescens*, Boyne, in Mass.

Cockerell, T. D. A., 1898.—Canadian Entomologist, Vol. XXX., pp. 293–294, references are made to *Lecanium caryæ*, Fitch., and *L. corylifex*, Fitch., found in Mass.

Cockerell, T. D. A., and King, G. B., 1898.—Canadian Entomologist, Vol. XXX., p. 326, *Sphærococcus sylvestris*, new to America, is found in Mass.

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Cooley, R. A., 1898. Canadian Entomologist, Vol. XXX., p. 232. *Diaspis amygdali*, Tryon, is found at Jamaica Plain, Mass.

Cooley, R. A.—Bul. No. 17, N. Sr., U. S. Dep. Agr., Div. of Entom., pp. 61-67. Pseudococcus aceris, Sign. (*Phenacoccus aceris*, Sign.; *Gossyparia ulmi*, Geoff.; *Aspidiotus Fernaldi*, Ckll.; *A. Forbesi*, Johnson; *A. ancylus*, Putn.; *A. perniciosus*, Comst., and *Diaspis amygdali*, Tryon, are recorded from Mass.; and on p. 23, Mr. Cooley speaks of finding *Pulvinaria innumerabilis*, Rathv., at Amherst, Mass.

Comstock, J. H., 1880–1.—U. S. Agr. Rpt., pp. 215, 225, 248, *Pinnaspis pandani*, Comst.; *Mytilaspis pomorum*, Bouché, and *Icerya Purchasi*, Mask., are cited from Mass.

Fernald, C. H., 1894.—Mass. Hatch Exp. Sta. Rpt. for 1894 is an account of the occurrence of *Orthezia insignis*, Dougl., found in the college greenhouse.

Fernald, C. H., 1895.—Bul. No. 4, Mass. Hatch Exp. Sta. Crop Rpt., Aug., 1895, p. 25. I have not seen this.

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Fernald, C. H., 1896.—Mass. Agr. Rpt. for 1896, p. 86, The San Jose Scale in Mass.; and in the same publication, p. 44–5, the same scale is treated upon.

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Harris, T. W., 1829.—New England Farmer, Vol. VII., p. 289, gives a short account of *Coccus cryptogamus*, Dalman (*Chionaspis furfurus*, Fitch.), found in Mass.

Harris, T. W., 1841.—Insects Injurious to Vegetation in Mass., pp. 201–203. The following are said to occur in Mass.: *Coccus hesperidum*, L. (*Lecanium hesperidum*, L.); *Coccus adonidum*, L. (*Dactylopius*

adenidum, L.); *Coccus arborum linearis*, Schr. (*Mytilaspis linearis*, Mod.), and *Coccus cryptogamus* (*Chionaspis furfurus*, Fitch.).

Howard, L. O., 1894.—Year Book, U. S. Dep. Agr., p. 255. Among others he cites *Mytilaspis pomorum*, Bouché, and *Chionaspis furfurus*, Fitch., from Mass.

Howard, L. O., 1894.—Insect Life, Vol. VII., p. 5, *Chionaspis furfurus*, Fitch., is said to occur in Mass.

Howard, L. O., 1894.—Insect Life, Vol. VII., p. 236, in his treatise on the maple *Pseudococcus*. *P. aceris*, Sign., in America, he cites it from Mass., on maple at Jamaica Plain.

Howard, L. O., 1896.—Bul. No. 2. N. Sr. U. S. Dep. Agr., The History of San Jose Scale in America, *Aspidiotus perniciosus*, Comst., is cited in Mass.

Howard, L. O., 1896.—In a paper read before the Mass. Hortic. Soc., Feb., 1896, and published by Brookwell and Churchill, Boston, Mass., among others he speaks of *Aspidiotus perniciosus*, Comst.; *Mytilaspis pomorum*, Bouché; *Chionaspis furfurus*, Fitch., and *Aulacaspis rosæ*, Bouché, occurring in Mass.

Howard, L. O., 1898.—Bul. No. 17, N. Sr. U. S. Dep. Entom., p. 16, *Asterolecanium quercicola*, Bouché, is cited from Mass.

Hunter, S. J., 1899.—The Coccidæ of Kansas, II., contribution from the Entomological Laboratory, No. 66, 1899, p. 70. Lecanium Cockerelli, Hunter, is described, and said to have been found by Mr. G. B. King (of course from Massachusetts).

Kirkland, A. H., 1897. — Mass. Agr. Rpt., 1897, pp. 244–247, he treats on *Gossyparia ulmi*, Geoff., as injurious to American elms in Mass.

Kirkland, A. H., 1898. — Mass. Crop Rpt., pp. 24–38, is a lengthy treatise upon *Aspidiotus perniciosus*, Comst., in Mass.

King, Geo. B., and Cockerell, T. D. A., 1897.—Canadian Entomologist, Vol. XXIX., pp. 90–93, *Lecanopsis lineolata*, *Phenacoccus americanus* and *Ripersia Blanchardii*, n., sp., are described from Mass.

King, G. B., and Cockerell, T. D. A., 1898.—Psyche, Vol. VIII., pp. 286–287, *Pulvinaria innumerabilis*, var. *tiliæ*, n. var., is described from Mass.

King, G. B., and Cockerell, T. D. A., 1898.—Ann. and Mag. of Nat. Hist., ser. 7, Vol. II., 1898, they describe *Kermes nivalis*, n. sp., from Lawrence, Mass.

King, G. B., and Tinsley, J. D., 1897.—Psyche, Vol. VIII., pp. 150–151. *Dactylopius claviger*, n. sp., is described from ant-nests in Mass.

King, G. B., and Tinsley, J. D., 1898.—Psyche, Vol. VIII., pp. 297–298. *Dactylopius Cockerelli*, n. sp., is described from Mass.

King, G. B., 1897.—Entomological News, Vol. VII., pp. 125–129. Aphides and Coccids associated with ants. Among others are mentioned *Ripersia Kingii*, *R. lasii*, and *R. flaveola*, Ckll., from Mass.

King, G. B., 1899.—Psyche, Vol. VIII., p. 312, *Ripersia lasii*, Ckll., is found infesting the roots of China Asters at Lawrence, Mass.

King, G. B., 1899.—Psyche, Vol. VIII., pp. 334–336. *Chionaspis furfurus*, var. *fulva*, is described, with notes on other species. Prof. Cockerell has called my attention to a very bad mistake in my citation of the localities of *Chionaspis furfurus*, Fitch. (See Psyche, Vol. VIII., p. 335, and the sixth line from the bottom. It should read North Carolina, and not Northern California.)

King, G. B., 1899.—Psyche, Vol. VIII., p. 350, *Aspidiotus hederæ*, Vall., and *Aulacaspis elegans*, Leon., are found in a greenhouse, imported from Bermuda.

King, G. B., 1899.—Canadian Entomologist, Vol. XXXI., 1899, Contribution to the Knowledge of Massachusetts Coccidæ. I., pp. 109–112.
do. .. .. II., pp. 139–143.
do. .. .. III., pp. 225–229.
do. .. .. IV., pp. 251–255.

Lounsbury, C. P., 1895.—The 32nd Ann. Rpt. of Mass. Agr. Coll. = Appendix =. This treats upon all known *Orthezia* to date, and cites *Orthezia insignis*, Dougl., from a greenhouse at Amherst, Mass.

Lounsbury, C. P., 1895.—Bul. No. 28, Hatch Exp. Sta., Mass. Agr. Col., p. 23 and 26, cites *Gossyparia ulmi*, Geoff., and *Orthezia insignis*, from Mass.

Marlatt, C. L., 1899.—Science for June, 1899, p. 835–837. The author criticises and doubts the validity of *Chionaspis furfurus*, var. *fulva*, King, from Massachusetts.

Packard, A. S., 1869.—Mass. Agr. Rpt., pp. 257–261. The following species are said to be common in Mass.: *Aspidiotus bromeliæ* (*Aulacaspis bromeliæ* Kerner); *Lecanium platycerii*, Pack. (now unrecognized); *Lecanium filicum*, Boisd., and *Coccus adonidum* L., (*Dactylopius adonidum*, L.).

Packard, A. S., 1871.—American Naturalist, Vol. IV., p. 686, substantially the same as the above.

Packard, A. S., 1886–1890.—Fifth U. S. Rpt. Entom. Com., p. 537. It states that *Chionaspis furfurus*, Fitch., was described from Mass. on apple and pear.

Pergande, Thos., 1898.—Bul. No. 18, n. sr., p. 27, U. S. Dep. Agr.: in his description of *Lecanium nigrofasciatum*, he cites it from Boston, Springfield and Deerfield, Mass.

Parrott, P. J., 1899.—Canadian Entomologist, Vol. XXXI., p. 11, he describes *Aspidiotus Fernaldi*, var. *Cockerelli*, and states that *A. Fernaldi* is found on honey locust in Mass.

Parrott, P. J..and Cockerell, T. D. A., 1899.—The Industrialist for March, 1899, p. 165, notes with formula of the antennæ of *Lecanium coffeæ*, from greenhouse at Lawrence, Massachusetts.

Parrott, P. J., and Cockerell, T. D. A., 1899.—The Industrialist for April, 1899, pp. 233–235. Important notes appear treating upon *Lecanium cynosbati*, Fitch.; *L. tarsale*, Sign.; *L. nigrofasciatum*, Perg.; *L. quercifex*, Fitch., and *L. Kingii*, Ckll., all from Mass.

Parrott, P. J., and Cockerell, T. D. A., 1899.—The Industrialist for May, 1899, pp. 276–277, mention is made of *Aspidiotus elegans*, Leon., and *A. Crawii*, Ckll., from Lawrence, Mass.

Riley, C. V., and Howard, L. O.—Insect Life, Vol. V., p. 51, is a note recording *Gossyparia ulmi*, Geoff., at Boston and Brighton, Mass.

Scudder, S. H., 1899.—Psyche, Vol. VIII., p. 299, *Ripersis lasii*, Ckll., is found infesting the roots of China Asters at Lawrence, Mass.

Tinsley, J. D., 1899.—Canadian Entomologist, Vol. XXXI., p. 45, in his contribution to Coccidology, II., *Dactylopius Kingii*, Ckll., is reduced to a synonym of *Dactylopius sorghiellus*, Forbes.

Tinsley, J. D., and King, G. B., 1899.—Entomological News, Vol. X., p. 37, they describe as new *Ripersia minima*, from Lawrence, Mass.

A NEW GENUS AND SPECIES OF PHYCITINÆ.

BY GEO. D. HULST, BROOKLYN, N. Y.

Monoptilota, n. gen.—Palpi ascending, second article heavy, third short; maxillary palpi small; front broad, flattened, ocelli not discernible in undenuded specimens: antennæ of ♂, first joint much lengthened, swollen, followed by a decided, rather lengthened bend, hollowed on

the inside into a deep furrow or pocket its entire length, the edges scaled, becoming tufted on posterior edges outwardly; beyond sinus filiform; from beyond basal joint the antennæ are unipectinate, the pectinations one on each segment, filiform, being longest just beyond sinus, and these five or six times the diameter of the stem, each armed with straight parallel hairs on each side; end segments ciliate. Antennæ of ♀ filiform ciliate. Thorax and abdomen rather stout, the genital armature of ♂ prominent. Fore wings rather elongate, subtriangular, 11 veins. 4 and 5 separate, 6 from cell near angle, 8 on 7, 9 and 10 from cell. Hind wings broad, 8 veins, 2 near angle, 3 from angle separate from 4, 4 and 5 stemmed half their length, 6 separate from 7. Cell very short, not more than ¼ wing length. Legs as usual in the group, rather heavy.

A very peculiar genus, with *Ceara*, Rag., unique in the unipectinate antennæ of the ♂.

M. nubilella, n. sp.—Expands 21–23 mm. Palpi dark fuscous, lighter on inner side; front fuscous, much darker in front of eyes; in one specimen purplish in middle, antennæ fuscous; thorax fuscous, with purple tint more marked in front, and lightening into grayish behind; abdomen fuscous to light fuscous-gray, somewhat purplish on anterior segment. All the segments darker lined; fore wings dark fuscous, broadly shaded with blackish longitudinally on veins, and lightened with white scales on anterior half, and submarginally making these portions gray, with blackish dashes of ground colour, the gray being most decided on sub-basal and central anterior portions. Over the wings on the intervenular spaces is a purplish stain, more evident posteriorly; cross lines faint, whitish, the inner shown mostly by the heavier dark angulate, somewhat diffuse, blackish outer shading, the outer fine, rounded outwardly in middle, with indistinct dentate tendency; discal spots geminate, black; marginal line broken, black; fringe fuscous. Hind wings dark smooth fuscous, lighter basally and along inner margin, the lines darker. Beneath even smooth fuscous, the fore wings the darker; marginal line blackish.

Specimens from National Museum and Department of Agriculture, taken in Maryland, Florida and Alabama. The insect, which promises to be of considerable economic importance, will have its habits and history made known by the Department of Agriculture. The type number in National Museum collection is 4393.

METZNERIA LAPPELLA, L.—A CURIOUS LIFE-HISTORY.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

In the beginning of September, 1898, I discovered, in the heads of burdock (*Lappa major*, Gærtn.), a curious larva, of which the following is a description :

Head bilobed, brown. Mouth organs large. A brown plate, marked longitudinally with a white line, on the second segment. Body rounded, much crinkled, of a fatty appearance, having a few white hairs along the sides. Anal segment small and protruding. The legs small and weak. The pro-legs seemingly atrophied into mere pseudopodia. Length of larva, two and a half lines.

On the approach of winter, the larva, having eaten out a convenient hollow in the closely-packed seeds, cemented its surroundings together, and then lined its cell with a flocculent white cocoon. In this it remained unchanged till the beginning of June, when it went into chrysalis.

The pupa was of elegant shape, amber-coloured—the head parts darkening into brown. The antennæ and legs were traceable through the skin. The length of the pupa was three lines. The moths appeared in the end of June and continued till August. They mated about the middle of July.

The dimensions of the perfect insects were as follows :

Expanse of wings (♂) 5½ lines, (♀) 9 lines. Length of body (♂) 2½ lines, (♀) 4 lines. Length of antennæ (♂) 2 lines, (♀) 3 lines.

The eyes of the moth were large and prominent, in colour they were a rich brown. The palpi were reflexed—the second joint was long and had long scales, and the terminal joint was pointed. The antennæ were filiform, prettily encircled with minute short bristles at the joints. The proboscis was long and coiled up watch spring fashion. The body terminated with a tuft like a paint brush. The tibia in the hindmost pair of legs had two pairs of spurs ; that in the second pair of legs had but one pair.

The fore wings were of a pale sienna-brown, with a patch of darker brown extending along the costa and towards the inner margin for two-thirds of the length of the wing. There were three or four lines of darker scales towards the hind margin and following its curve. Some of the specimens had the three dots on the disk, spoken of by Stainton (*Man. of Bh. But. and Moths*, Vol. II., p. 348).

The hind wings were slate-coloured, and had long fringes of the same hue.

The eggs of the moth (obtained by pressure) were very minute, globular, smooth and white. They are dropped probably into the flower-head of the plant, for the most careful microscopical examination showed no opening made by a larva through the involucre.

On August 4th I found the newly-hatched larva biting into the side of one of the outer seeds. The seeds at this time were white and tender. The body of the larva was white, waxen and semi-translucent.

The insects were identified for me by Lord Walsingham and Mr. J. Hartley Durrant. To them also I am indebted for the correction of the generic name from *Parasia* to *Metzneria*, Zeller.

It may be asked, How was this European insect advanced to Canada? This probably is the correct answer: At Point Levi there is a quarantine station for cattle, and Old Country hay and straw are often landed with the cattle, and burs containing larvæ of the species have at some time been landed with the fodder. The burdock is plentiful on all our roads.

BOMBYX CUNEA, Dru.

The latest communication of the Rev. T. W. Fyles on this subject may be briefly corrected by the following synonymy:

Spilosoma, Steph.
prima, Slosson.
cunea, Fyles (nec. Drury).
congrua, Walk.
antigone, Strk.
Hyphantria, Harris.
cunea, Dru.
punctatissima, S. & A. (et al.)
var. budea, Hubn.
textor, Harr. (et al.)

There can be no manner of doubt of Drury's figure. It represents the spotted form of Hyphantria. The description of the abdomen, at the last resort, is conclusive. The only point in doubt, as Dr. Ottolengui says, is as to the possible specific distinctness of *cunea* and *budea*. But Mr. Lyman is at work upon this, and may be able to give us some results later on.

Harrison G. Dyar, Washington, D. C.

INSECT BITES AND THE EFFECTS THEREOF.

BY CHARLES P. LOUNSBURY, DEPT. OF AGRICULTURE, CAPE TOWN, S. AFRICA.

The letter from Dr. Behr, under the caption, "A Californian Tick," in the August issue of the CANADIAN ENTOMOLOGIST, bears on a subject becoming fraught with interest to many investigators engaged in public service. It is with the object of stating my crude ideas on the matter, that of serious and exceptional effects sometimes following insect bites, and of relating my experience with man-attacking ticks, that I contribute this note. First, I think that a distinction should be drawn between the sting or bite of insects (I use both "bite" and "insects" broadly) that seek their prey for food only, as mosquitoes, ticks, and bugs, and those whose attack is primarily and purposely to inflict injury, as centipedes, spiders, and many hymenopterous insects. It is with the former class only that I now concern myself.

There seems to be an object in all the intricate relationships between the various forms of life, and, in general, we have not far to seek in ascertaining the object of any severe injury to one form by another. Rarely, if at all, do we find an organism wantonly inflicting injuries that must act directly for its own destruction. A mosquito, a flea or a tick seeks an animal to supply itself with food; and injury beyond that necessarily caused in puncturing the skin and in stimulating the flow of blood from the tissues beneath appears to be unnatural and abnormal. This direct injury, unless immensely multiplied, is, I incline to believe, never of a serious nature to a man or any other animal in a normal state of health. For *Argas persicus* to inflict a bite which of itself proves fatal seems monstrous. The destruction of the life of a man would not benefit the tick, when all it requires is but a mere drop of blood; and, on the other hand, for its bite to prove fatal would soon bring the tick to the verge of eradication. The case is quite different with the insects that consume much of their host, as hymenopterous parasites for instance, for they utilize their host to the utmost whilst destroying it.

Reasoning thus, and influenced doubtless by recent discoveries in the transmission of certain diseases by the agency of insects, I have come to believe that the direct injury inflicted by any individual insect when seeking a temporary supply or food is very rarely of a serious nature to a host healthy in mind and body. When the number of parasites is immensely multiplied, serious consequences may follow, but then we approach the condition instanced in the case of hymenopterous parasites. Apparent

exceptions to this rule do exist, but for most that have occurred to me I believe there is a reasonable explanation. For example, a single tick may paralyse a sheep or cause serious lameness in a horse, but only because the tick has chanced to insert its rostrum into particular tissues; in these cases, I have known the removal of the tick to afford almost immediate and entire relief.

An idea of this sort is at most a theory, but much support for this one may be obtained by its satisfactory application. As to how it is that various disorders, often of a serious and even fatal character, are induced or rather follow the attack of particular insects, even in limited numbers, I can only express the opinion that the effects are due, not to the primary injury, but to the incidental transmission of an organism quite as foreign to the attacking parasite as to its host. Thanks to American investigations, scientific research has shown that the Texas Fever organism is transmitted by ticks. I have affirmed this discovery in South Africa, and can add that we have ticks innumerable and of the same species in non-fever districts as we have where the fever is most prevalent; and further, that ticks were known in the present fever areas long before the disease spread into the Colony. Major Bruce, by his labours in Zululand, has demonstrated that the bite of the notorious Tse-tse Fly is only fatal because of the incidental introduction of an infusorial parasite. Dr. Koch, I understand, is now connecting malarial fevers with mosquitoes in an analogous association. Ticks are the cause of sheep dying in Great Britain because they may transmit to their host the bacillus of Louping Ill. Other instances still might be cited, but these I think are sufficient to impress one with the fact that insects are often only unconscious agents, not principals, in causing serious consequences through their bites.

The simple bite of an insect varies in its effects with different subjects, but, as Dr. Behr remarks, the variations seem due to personal idiosyncrasy. A Kafir laborer, treading on an Acacia thorn, will simply grunt, and after withdrawing it from his foot will go on unconcernedly with his work, although it may have pierced his leather-like sole a full inch; a European would be brought to the verge of tears, and might think himself incapacitated for further work during the rest of the day. Just so a native is as little annoyed with head-lice as a dog is with fleas, and sleeps soundly in his squalid hut while bed-bugs carouse over his naked body. From the vermin-seasoned, unfeeling savage to the super-sensitive product of civili-

zation there are innumerable gradations, and hence some variations in the effect of simple insect bites.

Some variation is due to other factors. Bites may be followed with less pain if the insect is allowed to work undisturbed. As a child, I was taught not to slap mosquitoes until they were ready to depart, and my impression is that following this instruction has saved me suffering. Persons bitten by Argasids have told me the pain is always greater if they disturb their tormentors. I have not tested this assertion, but I know that the bite of Argasids left to finish their meal in peace is trifling in after-effects compared with that of Ixodids which have been disturbed by forcible removal: one must remove the latter class of ticks or suffer their presence a number of days. Even if one of the latter kind has not fully inserted its rostrum preparatory to feeding, the after-effects are relatively more painful. Again, the structure of a tick's rostrum is such that forcible removal of the body often leaves a portion of the organ imbedded in the flesh. Large and painful festers may be thus initiated, which, if not properly attended to, may lead to serious consequences. Further, tick bites may be made more painful by indiscreet scratching or by irritation from one's clothing. In May last, while absorbed in watching larval ticks on grass tops, I became covered with the little fellows. Many worked their way through my clothing and my body in places was soon stippled with attached ones. Instead of smearing these with oil and leaving them to detach themselves, a measure which prevents almost all further irritation, I simply scrubbed them off in my bath. The result was innumerable painful though minute festers on my ankles and back. One cannot easily reach his back between the shoulders, and there the inflammation and pain soon subsided; but for ten weeks my ankles, which came in for scratchings without number and were also in continual friction with my boots, remained painfully sore. Occasional injury beyond that incidental to the bite may be caused, I suspect, by the introduction of the organisms found in abscesses (such as *Streptococcus pyrogenes*). The attack of a certain cattle tick in this country is not uncommonly followed by the formation of an abscess, and it may be that in this case the tick or ticks had previously feasted about a similar sore; certain it is that many are often to be found clustered about great festers.

Dr. Behr, like myself, scouts the supposition that *Argas persicus* inflicts a fatal wound. He suggests that the fatality may be due to the coincident occurrence of malaria, and mentions that malarious fevers

are very common in the region where the tick is recorded to occur. He considers *A. persicus* a local tick, and hence has seemingly thought it indiscreet to couple the tick with the malady as a transmitter of the latter from person to person. But there is good ground for considering *A. persicus* a widespread creature. A fowl-attacking tick in India is referred to the species, and also one in Australia. From a comparison of specimens from these countries with specimens of *Argas americanus* from Texas and with the common fowl tick of South Africa, Claude Fuller (now Natal Entomologist) and myself concluded that all were of one and the same species; on referring South African material to A. D. Michael, the well-known English authority on the group, we were told that our ticks presented no differences to *A. persicus*, and, moreover, that *A. persicus* was probably nothing more than the European *A. reflexus*. The *A. columbæ* mentioned by Dr. Behr, it may be added, is given by Neumann as a synonym of *A. reflexus*. Thus the historical, man-killing tick of Persia appears to be now found on five continents. This is not at all remarkable, for a parasite common to many birds like this one is readily distributed. Two trustworthy correspondents of mine say they have been bitten by our South African *Argas*, but both scoff at the idea of serious consequences ever following the bite. To note the effect of the bite myself, I recently permitted a long-starved specimen to refresh itself from my arm. It remained on sixty-five minutes, and then, loosening its hold, crawled off. In this time it had distended itself fully. The wound took a fortnight to heal, but I scratched the scab off several times when not thinking; otherwise it might have healed in a shorter time. The swelling and inflammation were slight, as was also the usual exudation of serous matter. The annoyance was limited to an occasional trifling itch such as the presence of a flea at work occasions me.

Further evidence indicative of the disease-transmission theory is afforded by the circumstances surrounding another tick whose bite is considered serious to man in some parts. I refer to *Ornithodoros Savignyi*, Audouin. This is an African species which mayhap be identical with the very one which prompted Dr. Behr's letter.* This tick, in common with mosquitoes and certain other flies, is credited with the spread of fever by

*Neumann in his monograph does not give extensive ground for separating *O. Savignyi* and *O. turicata*. In this country, natives are known to carry the tick unintentionally with their belongings from place to place. It might easily have been introduced into America with slaves in the last century or earlier, just as negroes, returning to Africa, are said to have introduced here the Jigger Flea (*Sarcopsylla penetrans*); this latter insect continues to spread, and is now found as far south as Durban, Natal.

some of the native tribes in Rhodesia; and the Namaquas, near the Orange River mouth, who have a perfect dread of it, and who will not rest in situations they suspect to be infested, also believe that it induces serious illness. David Livingstone heard stories to the same effect from the Portuguese in East Africa, and in his "Travels in South Africa," page 383, he thus describes the effects of the bite, apparently as experienced by himself: "These are," he says, "a tingling sensation of pain and itching, which commences ascending the limb until the poison imbibed reaches the abdomen, where it soon causes violent vomiting and purging. Where these effects do not follow, as we found afterwards at Tete, fever sets in; and I was assured by intelligent Portuguese there that death has sometimes been the result of this fever."

Now this tick, commonly known as "tampan," is spread far and wide in South Africa, and I am told is exceedingly common in the huts of natives in some parts. In the dry north-west of this colony, everybody seems to be acquainted with it and its bite. It is frequent at the uitspans (that is, places to rest the transport animals), and hence travellers nearly all receive its attention. But in these parts little more is thought of its bite than that of the bed-bug; and to my predisposed mind it has occurred that all the stories of serious effects come from notorious fever districts. Somewhat more than nine months ago I was favored with a collection of specimens from a Transvaal correspondent. He obtained them from an outhouse on his farm which had become infested simultaneously with the arrival of a batch of Bechuana natives from their own country. These tampans have been kept in a glass tube, and their long fast has made little difference in their appearance. They lie motionless in the dry earth enclosed with them and patiently await a host. Until I read Dr. Behr's letter, now two months ago, I had not "screwed up" sufficient courage to let any of the repulsive creatures repast at my expense, but his remarks decided me. On September 8th, I fed one in the morning and one in the afternoon. Both were simply placed on my arm, and they attended to their wants without further invitation. Neither was restless, but immediately scratched a hole and began. One staid on an hour and the other two hours. There was no sensation of pain in either case, but an exudation of a transparent fluid was observed to collect beneath the body of the tick, and the evaporation of this appeared to be responsible for a slight sensation of cold or numbness; at times, too, there was a slight tickling. At the conclusion of the respective banquets, each

was fully distended with blood. When they left, there were slight inflamed spots about two millimetres in diameter, but no abrasions visible, so neatly had the operations been performed. The next day the spots were somewhat swollen, and on the next there was a slight exudation of serous matter. There was, however, no pain beyond an itch when I was tired and sleepy. On the night of the third day I was taken violently ill with purging, accompanied by profuse perspiration and weakness. For a short time I was happy in mind (though not in body) with the thought that the ticks had given me an up-country "fever," but to my disappointment no fever set in; indeed it was two or three hours before my temperature rose to anything like the normal, from which it had dropped nearly three degrees during the acute distress. The following day I consulted the Colonial Medical Officer, and our conclusion was that while the attack might possibly have been induced through the ticks, the odds were much in favour of ptomaine poisoning; the fact that I had partaken of shop-made sausage a few hours previous to the illness favoured the latter view. Therefore it was desirable to have a fresh test conducted, and as, if the trouble arose from the ticks, there was a possibility of my now being immune, I was not a favourable subject. The Chief Inspector of Sheep for the Colony, A. G. Davison, volunteered to accept the risk, and at once a tick was placed on his arm. In forty minutes its distension was complete and it relaxed its hold. On the next day, feeling stronger myself and too enthusiastic to decide the doubt to heed any danger, I applied another specimen to my own arm; this one was a mature female, and when it withdrew fifty minutes later it had swollen to ten millimetres in length by seven in breadth. The critical third night passed without mishap either to Mr. Davison or myself. Nearly two months have now elapsed, and still none of the looked-for symptoms have appeared; and I feel convinced that the sausage was responsible in the first instance. The wound on Mr. Davison's arm healed in ten days. All three on my arm took at least a fortnight, and the last nearer three weeks, but I am less robust than Mr. Davison. The swelling in no case was more than trifling, and the inflammation, also slight, lasted but three or four days. I carefully watched for a rise in temperature after the last bite, but none took place. All this detail is mentioned to show that the tick has had a fair trial, and has failed to maintain its evil reputation. But however much one may doubt native traditions, one cannot refuse to credit Livingstone's account; and therefore my opinion is strengthened that in some sections the tick is the

transmitter of fever germs. The creature is long-lived, and while it requires few meals, perhaps only one in each moult, it may take the different meals from different persons. Parties native or long resident in fever districts often become, in a measure, immunized to the disease; but tampans, from feeding on the blood of such parties, might derive organisms which, transferred to susceptible newcomers, would induce a serious attack of the complaint. Students may shake their heads over this, but the transmission of fever in this manner would not be one whit more remarkable than the transmission of Texas Fever in cattle through a similar agency. When studying the metamorphosis of a certain cattle tick recently, I unintentionally gave this disease to a cow located far from any infected area, stabled night and day, and fed entirely on dry forage. The case was diagnosed by the Colonial Veterinary Surgeon, the best authority in the country, so its determination admits of no doubt. But the strange part is that the ticks inducing the disease must have had it transmitted to them from the mother tick; this had been collected in a Texas Fever area *ten months before.*

To refer again to *Argas persicus*, the change in location of a settlement affording temporary relief to the Persians may be explained without considering the relief evidence of very local distribution of the pest. All is, the tick only becomes abundant where its food supply is located. It does not multiply rapidly, but takes its meals so infrequently that its round of life is an extended one: therefore, after a few years an abode may become teeming with them. If such a place be occupied after a long period of disuse, the occupant would draw a multitude of the creatures from their lurking places; the presence of a clean-skinned stranger among the dirty inhabitants might also bring out the enemy in unusual numbers. In the long interval between its meals, the tick secretes itself away from its host just as a bed-bug does. Therefore the removal of the inhabitants and their scanty belongings leaves all or nearly all of the pest behind, perhaps to take a year or several years to starve to death. If the people change their location simply to get away from their vermin, it is probable that they look over their chattels to see that none is carried to the new quarters, and thus for a while they may have complete relief.

The apparently local distribution of *O. Savignyi* in parts of South Africa may be explained as I explain that of *A. persicus*. In the northwest of this Colony, *O. Savignyi* has the name of occurring almost solely in the shade of the Cameel Doorn (*Acacia giraffæ*). No experienced

traveller to those parts, I am told, rests himself or his horses under that tree. Elsewhere in the north-west certain other vegetation is avoided by the knowing ones. Away from these plants, one may rest with little risk of attack, but beneath them he will generally soon find things altogether too lively for comfort. I have sought an explanation from travellers, and have this plausible one from a surveyor, who is also an observant naturalist: The Cameel Doorn is the most common tree in those sun-scorched, sandy parts, and offers almost the only available shade to horses and cattle. These animals therefore seek that tree, and there they are frequented by the tampan, which, it should be stated, attacks horses and cattle as freely as men. Certain other vegetation may shelter sheep and goats, but these are not found in all localities My informant had never watched the small stock to notice if the tampan attacked it, having taken this for granted; but he had observed that it was only in small stock districts that it was necessary to avoid low bushes which afford shade as well as the higher Cameel Doorn. The inference is that there is a triangular association between shade, animals, and the tampan tick. That no tree or plant is necessary for the welfare of the tick is evidenced by the fact that in some parts of the country it takes up its abode in native huts. The thatched roof and basket-work wall of a hut gives them the necessary shelter. On the veldt, they usually appear from the sand. It is motion, not sound or scent, apparently, that attracts them, but this statement requires elaborate experimental confirmation.

In conclusion of these somewhat disjointed remarks, I trust that they, in conjunction with Dr. Behr's letter, will have influence in arousing more interest in the somewhat neglected subject of insect bites and their effects. There are many lines open for original research, and there is a distinctly economic phase to some. For instance, if it can be demonstrated that fowl ticks, and other poultry parasites that alternate periods of rest away from the host with their gormandizing, may and do communicate diseases, as seems likely, an important public service will have been rendered. That demonstration would have greater influence with the farmer in inducing him to wage effective war against the vermin than a score of bulletins describing the insects and suggesting remedies. In this Colony we are now striving to prove a connection between our worst sheep and goat disease and ticks; and if we succeed, as now seems probable, we anticipate an immense "boom" in tick destruction, and consequent improvement in stock of all kinds.

NOTES ON SPECIES OF THE TETTIGIAN GROUP OF ORTHOPTERA.

BY J. L. HANCOCK, CHICAGO.

An interesting addition to Orthopteran distribution in the West Indies is the finding by Mr. R. J. Crew of the species Neotettix quadriundulatus, Redtenbacher, on the Island on Haiti.

Eight specimens, kindly presented to me, were taken around Port au Prince, and, as Mr. Crew informs me, were "swept from plants along the banks of a small stream." I have identified this species, which was first described by Brunner and Redtenbacher, 1892, from the Island of St. Vincent, West Indies, in "Proceedings of the Zoological Society of London," and an excellent figure is to be found on Plate xvi., fig. 10. Here it is recorded as a Tettix, but subsequent study has shown its closer approximation to Neotettix, Hancock. Species of the latter genus occur on the mainland of the southern United States and Mexico. The above species was recorded "numerous" on the Island of St. Vincent. Mr. H. H. Smith found it at Chateaubelais, also at the south end of the island, near the sea, under decaying leaves. Brunner, 1893, again records this species from the Island of Grenada, at Mount Gay Estate, Caliveny Estate, Balthazar, in "Orthoptera of the Island of Grenada," Proceedings Zoological Society of London.

From a series of Tettigidæ kindly furnished me from Mexico by Mr. O. W. Barrett, I am able to describe two new species of the genus Tettigidea, Scudder:

Tettigidea jalapa, sp. nov.

Rather large. Eyes prominent. Above fusco-ferruginous, dark fuscous over entire face and the sides, the last few segments at the end of the abdomen pale, legs pale throughout, the maxillary palpi a little depressed apically and very light; below the edges of prominent points and abdominal rings light. Body long, granulate. Vertex a little wider or subequally broad with an eye; nearly flat, hardly advanced in front of the eyes, widening posteriorly, the front border very little convexed, passing latterly into small rounded and somewhat elevated carinæ ending abruptly near the anterior inner border of the eye; on either side and just behind are the very small lobes situated about the middle inner margin of the eyes in small sunken fossæ; mid-carina rather thin, extending backwards only as far as the ending of the lateral carinæ, but very little elevated, in front insensibly coalescing with the frontal costa;

in profile the apex obtusely rounded angulate, the frontal costa depresso-convexed in front of the eyes and advanced in front of the eyes about one-fourth their width; below the face is moderately declined; as seen in front the frontal costa is strongly sulcate, the branches commencing near the apex in front are gradually divergent to the middle ocellus, where they are more than usually separated. Eyes very prominent and globose. Antennæ very slender, reddish, inserted a little above and in front of the anterior inferior border of the eyes. Pronotum anteriorly angulate, the sides substraight, posteriorly long and subulate, the apex acute, passing the posterior femora; dorsum smoothly granulate, with no longitudinal wrinkles, or scarcely a vestige of vein-like arrangement of the granules between the shoulders; median carina distinctly elevated, nearly straight or gradually arched a little higher between and a little in front of the shoulders; humeral angles very obtuse, surface of dorsum between them tectiform; the anterior carinæ are curved, becoming a little divergent posteriorly; the borders of the posterior angle of the lateral lobe nearly form a right angle, acute at the apex; the posterior margin is straight and vertical. The elytra are nearly smooth externally, with a short thick oblique pale line very near the apex. Femora normal, the anterior and middle femora somewhat slender; the posterior femora rather broad, the first article of the posterior tarsus equals the third in length; the pulvilli subrounded below, the third is little the longest.

Length: body, ♂, 12 mm., pronotum 13 mm., post. fem. 7 mm. The wings extend beyond the apical process of the pronotum one millimetre.

Locality: Jalapa, Vera Cruz, Mexico, 4000 ft. elevation. June, 1898. O. W. Barrett.

Tettigidea chichimeca australis, form. nov.

Body rather small, fuscous, above ferruginous obscurely clouded with fuscous; face below the eyes light, spreading laterally over the lower portion of lateral lobes, pale underneath the abdomen; femora light obscurely clouded; tibia a little more distinctly striped with fuscous. Vertex scarcely narrower than an eye, obtusely angulate in front, a little produced in front of the eyes, the front margin formed of little lateral carinæ directed obliquely backwards and ending near the anterior inner angle of the eye, where the eye is a little conically elevated, feebly sulcate on each side longitudinally, the little lobes not very distinct, middle carinated, posteriorly extending only as far as the lateral carinæ, anteriorly coalescing with the shining frontal costa; in profile the vertex is obtusely

rounded, advanced in front of the eyes about one-third their breadth, the frontal costa convexed, the distance between the anterior margin of the frontal costa and that of the eyes widening considerably below; the face below imperceptibly continued and quite declined; the apex is strongly obtusely rounded. As seen in front, the frontal costa is sulcate rather deeply, commencing near the apex, the branches are from here to the middle ocellus sub-parallel, and not divergent as in *jalapa*. Pronotum with the dorsum anteriorly obtusely angulate, the sides a little convexed, posteriorly subulate acute, passing the hind femora; dorsum granulate, with an indistinct longitudinal wrinkle on either side running parallel with the humeral angles, otherwise scarcely rugose; median carina distinctly elevated, gradually but slightly arched between the shoulders, sloping to the front margin; anterior lateral carina near the front sub-straight and subdivergent posteriorly; humeral angles strongly sloping laterally, as seen in front obtuse, between the shoulders convexed, the median carina clouded with fuscous. Elytra almost smooth, dark externally, marked with a minute light oblique line near the apex. Wings extended beyond the apex of pronotum. Femora with the carinæ unchanged, the posterior femora quite large, the first and third articles of the posterior tarsi about equal in length, all the pulvilli of equal length.

Length: body, ♂, 9 mm., pronotum 9.5 mm., post. fem. 5.5 mm. Wings extending about one millimetre beyond the process of pronotum, making the total length 11 millimetres.

Locality: Cuernavaca Morelos, Mexico. May, 1898. O. W. Barrett.

This species is so closely related to Tettigidea chichimeca, Sauss., that I place it as a dimorphic form.

A NEW POPULAR NAME FOR CLISIOCAMPA DISSTRIA.

For many years this insect has been popularly known as "the forest tent-caterpillar." During the past two or three years it has attracted much attention in New Hampshire, Vermont, and New York, from its ravages in maple forests, city or village maple shade trees, and in many orchards. In orchards it has often worked with its near relative, the apple tent-caterpillar (*Clisiocampa americana*) Every one who critically observes the habits of these two species of caterpillars soon discovers that "the forest tent-caterpillar" is a very misleading name for *Clisiocampa disstria*, because its caterpillars never make a tent, while the apple tent-caterpillars always do. Several who have seriously discussed these insects recently have felt the necessity of a new popular name for *Clisiocampa disstria*. Professor C. M. Weed, of New Hampshire, when writing his recent excellent bulletin on the pest, asked me to suggest some

change in the name. But after considering such names as "the forest caterpillar," "the forest Clisiocampa," "the spotted forest caterpillar," "the maple Clisiocampa," I was unable to suggest any good substitute for the old name. Recently, however, while again cogitating on the subject, the name of "forest tent*less* caterpillar" suddenly appeared on the horizon of my thoughts. It seemed hardly the thing at first, but the more I thought of it the more appropriate it seemed. I brought the name before the Entomological Club, the Jugatæ, here at Cornell University, and all agreed it was a very apt and easy way to solve the problem. The name of "forest tentless caterpillar" retains all of the "old associations:" it is not a radical nor a difficult change to become accustomed to, and it expresses the characteristic difference between the habits of the caterpillar and those of the apple tent-caterpillar. I would therefore here propose that *Clisiocampa disstria* be properly known as the forest tentless caterpillar. Are there any serious objections to this name, or has anyone a better one to suggest? M. V. SLINGERLAND, Ithaca, N. Y.

MELANOPLUS DIFFERENTIALIS IN NEW JERSEY AND PENNSYLVANIA.

Professor J. B. Smith, of New Brunswick, N. J., first reported this grasshopper in this section, as occurring in cranberry bogs in New Jersey. In 1896 specimens were taken by Mr. W. H. Wensel, of Philadelphia, in Southern Philadelphia ("the Neck"); by Mr. S. T. Kemp, of Elizabeth, N. J., at Camden, N. J.; and by Mr. C. Fen Seiss, of Philadelphia, on August 26th, the latter on a window-sill in the centre of the city. Mr. Seiss has in his collection four specimens taken in 1897, on August 2nd, September 11th (two specimens), and November 6th—all from Philadelphia. The writer secured five specimens on September 5th and 11th at League Island and Philadelphia Neck, Philadelphia Co., Penn. They were collected on the large leaves of weeds, except one taken on a cement walk. In the same year specimens were taken at Riverton, Burlington Co., and Westville, Gloucester Co., N. J., by Mr. H. L. Vienck. In 1898 they first appeared mature about August 1st, in the streets, on lots, and even in the iron manufacturing sections of the city, where there is absolutely no vegetation. Their number was greatly increased, and they appeared to be firmly established. The year 1899 presented this species as a rather common grasshopper from August to October, with all the territory surrounding this city occupied by it. The range of this species this far east (Smith's record) was doubted by Scudder (Rev. Melan., p. 353), but he adds in a foot-note that he later noticed specimens in the collection of the American Entomological Society of Philadelphia from Camden Co., N. J. The range of this species to the north or south of this section I do not know, but I think it has come east to stay, as it seems to take possession of everything and thrive in its new location.

JAMES A. G. REHN, Acad. Nat. Sci., Philadelphia.

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A NEW SPECIES OF PLANT-LOUSE INJURIOUS TO VIOLETS.

BY THEODORE PERGANDE, WASHINGTON, D. C.

Among several species of insects which have lately come to the notice of the Division of Entomology of the U. S. Department of Agriculture, through their ravages upon greenhouse violets, is a little species of plant-louse known to florists as the black or brown aphis. The species is now very generally distributed in the United States and occurs in Canada, although it was not known until within five or six years from the time of writing. As it appears to be undescribed, I propose the specific name *violæ*, and have placed it in the genus Rhopalosiphum, to which it appears to belong. The following description is submitted, pending a more detailed account of the injuries and a consideration of remedies which it is expected will shortly be published by the Department of Agriculture.

Rhopalosiphum violæ, n. sp.

Apterous females dark cherry-brown and polished, the larvæ and pupæ generally somewhat paler. Eyes dark brown, third joint of antennæ more or less distinctly of a paler colour than the body, the remaining joints black. Legs purplish, the femora darkest towards the end and the apex of the tibiæ and the tarsi black. Nectaries purplish. Head and thorax of the pupæ generally paler than the rest of the body.

Winged females also dark cherry-brown or purplish-brown, the antennæ, thoracic lobes, terminal two-thirds or more of femora, apex of tibiæ and tarsi black; rest of the legs of a dull yellowish colour, with a tinge of purple. Nectaries and tail dusky. Wings clear, the veins strong and black and conspicuously shaded; stigma black; stigmal vein short

and strongly curved. Antennæ of all very long and slender, reaching considerably beyond the end of the body; joint six with its spur is much longer than the third, joints four and five are subequal in length, and each of them somewhat longer than the third; there are numerous sensorial tubercles on joint three and a few on joint four, while all of them are sharply serrate. The first joint is very much the stoutest, and bulging out strongly about the middle at the inner side; frontal tubercles prominent and gibbous at the inner apical angle. Legs long and slender. Nectaries clavate, reaching to the tip of the abdomen. Tail short and inconspicuous. Length of winged and apterous females about 1.6 mm. expanse of wings about 5 mm.

Type No. 4,467, U. S. National Museum. Many specimens. Type locality, Washington, D. C.

This is a singularly handsome species, which in the peculiarly short and strongly curved stigmal vein and strongly shaded venation reminds one of Callipterus; while the gibbous frontal tubercles recall those of some species of Myzus. There is also a queer tendency of losing one or both branches of the third discoidal vein, the stigmal and sometimes one or both of the veins of the hind wings. In one of the wings of one specimen the second and third discoidals arise from the same spot, while these two veins of the other wing arise from a common petiole.

These plant-lice are very numerous at the crown of violet plants, preventing the young leaves from unfolding or checking their development. Many are also found in the petioles and on the under side of the leaves.

ON TWO GENERA OF MITES.

BY NATHAN BANKS, EAST END, VA.

In 1871, Thorell published his description of *Rhagidia* in a paper entitled, "Om Arachnider fran Spetsbergen och Beeren-Eiland." He placed it in the family *Eupodidæ*, from the other genera of which it differed principally in the great size of the mandibles. In 1876, Cambridge, in his paper "On a new Order and some new Genera of Arachnida from Kerguelen's Land," described *Pœcilophysis* as the type of a new family and a new order. He was unaware of Thorell's mite, yet there is but one prominent difference between them, *Pœcilophysis* is said to have eyes on the frontal tubercle. Neither of these authors gave any reference to any species of Koch's genus *Scyphius*, to which their forms bear a great resemblance. Koch described about a dozen species of this

genus, many of which are doubtless only forms of one species. In the modern European literature, nothing is done with Koch's species of this genus, save by Oudemans (1897), who identifies four of the Kochian names. Oudemans, however, appears to be ignorant of the fact that there were several other names for this genus besides *Scyphius*, for he thinks, since *Scyphius* is preoccupied, that the genus must have a new name.

However, in 1886 it received two names, *Norneria* from Canestrini and *Scyphoides* from Berlese. The former has the priority, and is used by Berlese in his "Acari Italiani." Canestrini pleaded the impossibility of identifying Koch's species, and described both of the Italian forms as new, in which he has been followed by Berlese. Neither of the Italian authors appear to be aware of either *Rhagidia* or *Pœcilophysis*, else they would have mentioned the similarity between these forms; and Berlese omits these genera from his list, which professes to be complete for the world. There is not, however, any doubt that *Rhagidia* is generically the same as *Scyphius*, and *Rhagidia* has priority over all the other names proposed to replace *Scyphius* (which is preoccupied). *Pœcilophysis*, in spite of its alleged eyes, is not, in my opinion, distinct from *Rhagidia*. The *Scyphoides* of Karpelles (1891) is evidently a different genus, but somewhat allied to *Rhagidia*.

Rhagidia is thus a world-wide genus, known by the large mandibles and its resemblance to *Solfugidæ*, a fact noticed by both Thorell and Cambridge. The genus will stand as follows:

RHAGIDIA, Thorell, 1871.
Scyphius, Koch (preoccupied).
Pœcilophysis, Cambridge, 1876.
Norneria, Canestrini, 1886.
Scyphoides, Berlese, 1886.

It is impossible to tell how many of Koch's names represent good species; however, omitting these, there are the following species in the genus:

Rhagidia gelida, Thorell—Behring Island, Nova Zembla, Siberia.
" *kerguelensis*, Cambr. (Pœcilophysis)—Kerguelen.
" *gigas*, Canestr. (Norneria)—Italy.
" *clavifrons*, Canestr. (Norneria)—Italy.
" *hamata*, Kr. and Neum. (Scyphius)—Japan.
" *japonica*, Kr. and Neum. (Scyphius)—Japan.
" *pallida*, Banks—United States.

* * * * * * * * * *

In the Ann. Entom. Soc., France, for 1864, Lucas described, on page 206, a curious mite from Algeria and Tunis. He called it *Rhyncholophus (?) plumipes*. It differed from the ordinary species of this genus in a number of minor characters, but was chiefly remarkable in having on the hind tarsi a dense plume of long hair. Frauenfeld, in the Zool-bot. Ges. Wien., XVIII., p. 892, records having received specimens from Spain and Corfu, which he considers this species. He does not give any description of his forms, so it is not possible to tell whether they were the same species or not. Then, Haller, in his paper—Beit. zur Keuntniss der schweizerischen Milbenfauna—gave a figure and description of a mite, which he considered Lucas's species, from specimens collected in Switzerland. There are, however, numerous differences between his form and that described by Lucas, so there is no doubt that the Swiss species is new. In 1893, Birula, in Horæ Soc. Entom. Ross, p. 388, under the heading of "*Rhyncholophus (Macropus) plumifer*," describes an allied mite. He gives no reference to Lucas, and probably did not know of *R. plumipes*. The subgeneric name, Macropus, is not mentioned in the text of the article. His species came from Russian Armenia. C. F. George, in Science Gossip, Vol. III., p. 150 (1896), records *R. plumipes* from the Isle of Jersey; it is not certain that it is the species of Lucas. Now, in 1897, Cambridge, in the Proc. Zool. Soc., London, p. 939, gives the description and figure of a new genus and species of mite from Algeria—*Eatonia scopulifera*. He refers to Birula's paper, but not to that of Lucas or Haller. A glance at his figures and description shows that it is the same as *Rhyncholophus plumipes*, without the shadow of a doubt.

Now the question arises, "What is the name of this mite?" All of these mites have the same peculiar structure of the hind tarsi, and undoubtedly form a natural group of generic rank. The first name proposed, *Macropus*, by Birula (which is not mentioned by Cambridge) has been used several times in Zoology, and so is not available. *Eatonia* has been used at least twice before, and also becomes inapplicable. It is therefore necessary to create a new name for the genus. I propose *Lucasiella*.

As to the species, Cambridge's species is the same as that of Lucas. Haller's form is not the same, and may be called *L. Halleri*. Birula's species is a good one, so that there are at least three species of this genus in the Mediterranean region, which may be tabulated as below:

1. Body granulate; rostrum with a long spine; palpi tapering, straight; last joint of leg iv. not swollen ..... *L. plumipes.*
Body with scales or flattened hairs ..... 2.
2. Frontal tubercle with short spines; last joint of leg iv. swollen ..... *L. plumifer.*
Frontal tubercle with very long spines; last joint of leg iv. not swollen ..... *L. Halleri.*

LUCASIELLA, Banks.

Rhyncholophus, Lucas (in part), 1864.
Macropus, Birula (preoccupied), 1893.
Eatonia, Cambridge (preoccupied), 1897.

L. plumipes, Lucas, 1864—Algeria, Tunis, Corfu, Spain, Isle of Jersey.
Eatonia scopulifera, Cambr., 1897.
L. plumifer, Birula, 1893—Russian Armenia.
L. Halleri, Banks, 1899—Switzerland.
R. plumipes, Haller (nec Lucas).

NEW GENERA AND SPECIES OF EPHYDRIDÆ.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Psilopa flavida, n. sp. ♂.—Yellow, polished, the third joint of antennæ, except the lower side, dark brown; hairs and macrochætæ black, a vitta reaching from humerus to insertion of wing, and another on middle of pleura, black; abdomen, except first segment and middle of the second, black, with a strong violaceous tinge; knob of halteres greenish yellow; wings grayish hyaline, unmarked; two pairs of dorso-central mocrochætæ; length 2.5 mm. New Bedford, Mass. A single specimen collected by Dr. Garry de N. Hough. Type No. 4292, U. S. Nat. Museum.

Psilopa variipes, n. sp. ♀. Black, polished, the third antennal joint brown, its base yellow, knob of halteres white, middle and hind tibiæ and their tarsi yellow, apices of the tarsi brown; head, thorax and scutellum tinged with green, the mesonotum and scutellum slightly scabrous, less polished than the head and pleura, only one pair of dorso-centrals; wings hyaline, the hind crossvein distinctly clouded with brown; length 2 mm. Vancouver Isd., Brit. Columbia. Three specimens collected by Mr. C. Livingston. Type No. 4293, U. S. Nat. Museum.

Psilopa similis, n. sp. ♂ ♀.—Black, the third antennal joint brownish, knob of halteres white; all coxæ, femora, middle and hind

tibiæ and their tarsi, yellow; head and pleura highly polished, the abdomen less so, mesonotum and scutellum subopaque, slightly scabrous, thinly gray, prainose, one pair of dorso-centrals; wings hyaline, both cross veins clouded with brown, broad apex of wing also brown; length 2 mm. Biscayne Bay, Fla. (Mrs. A. T. Slosson), and Opelousas, La. (Mr. G. R. Pilate). Five specimens. Those from the last named locality are in the collection of Dr. Garry de N. Hough, to whom I am indebted for the privilege of examining these and other specimens belonging to this family. Type No. 4294, U. S. Nat. Museum.

Hyadina albovenosa, n. sp. ♀.—Black, the under portion of the third antennal joint, palpi, and tarsi except the last joint, yellow, the halteres whitish; face, cheeks and lower part of occiput opaque gray pruinose, remainder of occiput slightly polished, front highly polished, mesonotum and scutellum slightly less so, one pair of dorso-centrals, pleura thinly whitish pruinose, abdomen opaque brownish pruinose, the broad lateral margins and the fifth segment highly polished, genitalia light gray; wings grayish hyaline, the cross veins distinctly clouded with white. Length 1 mm. Tifton, Ga. (Oct., 1896), and Opelousas, La. (March, 1897). Three specimens collected by Mr. G. R. Pilate. Type No. 4295, U. S. Nat. Museum.

Gastrops nebulosus, n. sp. ♂ ♀.—Black, the antennæ, except the upper edge and sometimes broad apex of the third joint, apex of proboscis, stem of halteres, and tarsi, except the last joint, yellow; tibiæ reddish-brown; head, thorax and scutellum polished, sparsely covered with brownish pruinose spots, one pair of dorso-centrals; abdomen lustrous, tinged with bronze, coarsely punctured; wings hyaline, mottled with light and dark brown, a dark brown cloud on the cross veins, one below apex of the first vein, another midway between apices of first and second veins, one at apex of second vein covering a stump of a vein that projects into the submarginal cell from the second vein a short distance before its apex; apices of third and fourth veins bordered with brown, that on the third extending more than half way to apex of second vein, where it is considerably expanded; a faint brown cloud in the outer fourth of the first posterior cell, and one near centre of the second posterior cell; length 2 to 3 mm. N. C. and Tifton, Ga. (Oct.–Nov., 1896). Nine specimens; those from Ga. were collected by Mr. G. R. Pilate, and are in Dr. Hough's collection. Type No. 4296, U. S. Nat. Museum.

Nostima, n. gen. Hydrellinæ.—Second joint of antennæ destitute of bristles, arista with long pectinations on the upper side; two pairs of vertical bristles, a strong pair of ocellars, situated between the two upper ocelli, three pairs of extremely small fronto-orbitals forming a row along each eye; face strongly projecting forward below, in profile slightly concave to the lowest seventh, then strongly retreating to the oral margin, three bristles near each lower corner of the face; eyes densely pubescent. Thorax bearing two pairs of dorso-centrals, no bristly hairs between them, only a few on any portion of the thorax; two notopleural and a small sternopleural macrochætæ, two pairs on the scutellum. Abdomen composed of five segments, of which the second is as long as the three following taken together, the latter subequal in length. Legs destitute of long bristles. Venation normal, the costa is continued to the tip of the fourth vein, apex of second vein slightly nearer tip of the third than to the first, last two sections of fourth vein subequal in length. Type, the following species:

Nostima Slossonæ, n. sp. ♀.—Black, opaque, the legs polished, the under side of the third antennal joint, the tarsi except the last joint, and a band near the middle of each hind tibia, yellow; face gray pruinose, a small brown spot near the centre, front blackish brown, an ocellar dot, the upper corners and narrow orbits, gray; mesonotum gray pruinose, marked with five dark brown vittæ, pleura black, a gray streak near the middle of the front part, and another on the upper edge of the sternopleura; scutellum black, the front corners gray, metanotum and abdomen black, a pair of gray spots on the third, fourth and fifth segments; wings dark brown, the costal cell and the marginal cell adjoining it almost wholly white, a white spot covering a stump of a vein nearly midway between apices of first and second veins, a similar spot before, and another at the apex of the second vein, one near the apex of the submarginal cell, another in the first posterior cell slightly more remote from its apex than the above, one on the fourth vein opposite the one in the first posterior cell, one near the apex of the discal cell, and one on the opposite side of the fifth vein; a white spot on the small cross vein, one at each end of the hind cross vein, a nearly triangular spot in extreme apex of the first posterior cell, and a large one at the first third of this cell, a narrow one on the opposite side of the third vein, a whitish streak near base of discal cell, and another near centre of the third posterior cell; length nearly 1 mm. Biscayne Bay, Florida. A single specimen collected by Mrs. Annie T. Slosson, to whom this handsome species is respectfully dedicated. Type No. 4297, U. S. Nat. Museum.

Paratissa, n. gen. Notiphilinæ.—Second joint of antennæ covered with very short, stout bristles, and with a longer one, directed forward, at the upper angle of the inner side, arista with long pectinations on the upper side; two pairs of vertical bristles, an ocellar pair situated slightly lower than the two upper ocelli, a second pair placed a little lower than the lowest ocellus, also a third pair nearly midway between these and the lower edge of the front, the three pairs directed forward; four pairs of fronto orbitals, placed in a row along each eye, the upper pair the smallest, the two upper pairs directed outward, the others forward; face slightly projecting forward at the oral margin, in profile gently concave, bearing two macrochætæ near each lower corner, several stout bristles along the lateral oral margin, cheeks scarcely one-seventh as broad as height of eyes. Thorax bearing two pairs of dorso-centrals, one intra-alar, three supra-alar, one præsutural, one humeral, two notopleural, two mesopleural and one sternopleural macrochætæ; short, bristly hairs of mesonotum numerous and arranged in quite regular rows, two of which are between the dorso-centrals; scutellum covered with short, bristly hairs and bearing three pairs of macrochætæ, the intermediate pair less than half as long as the anterior pair. Abdomen composed of five segments in the male, six in the female. Tibiæ destitute of long bristles. Venation normal, costa reaching apex of fourth vein, apex of second vein slightly beyond middle between first and third veins, penultimate section of fourth vein two-thirds as long as the last section. Type *Drosophila pollinosa*, Williston, from St. Vincent, West Indies; three specimens were taken by Mrs. A. T. Slosson, at Biscayne Bay, Florida.

Ephydra austrina, n. sp. ♂ ♀.—Front in the middle polished bronze green, very thinly brownish pruinose, sparsely covered with short bristly hairs and with a pair of stout macrochætæ a short distance above the antennæ; an oval depression below the lowest ocellus, sides of front opaque brown pruinose, the narrow orbits gray, two fronto-orbitals each side; face near the upper edge green, polished, thinly grayish pruinose, remainder of face opaque brownish gray pruinose, the macrochætæ fringing the anterior oral margin few and rather short; antennæ black, the third joint destitute of a long lateral hair; proboscis grayish black, the apex yellowish, palpi brown; body green, mesonotum polished, thinly brown pruinose, five pairs of dorso-centrals, pleura greenish gray pruinose, a brown spot near the centre; abdomen subopaque, thinly gray pruinose; second, third and fourth segments in the male subequal in length, each slightly shorter than the fifth; femora green, tibiæ greenish brown, all thinly gray pruinose, knees yellowish, tarsi brown, not enlarged in either sex; wings hyaline; halteres yellow; length 4 to 5.5 mm. Georgiana, Florida. Nine specimens, collected by Mr. William Wittfeld. Type No. 4299, U. S. Nat. Museum.

NOTES ON SOME NORTH AMERICAN YPONOMEUTIDÆ.

BY HARRISON G. DYAR, WASHINGTON, D. C.

Family YPONOMEUTIDÆ.

Synopsis of North American Genera.

Hind wings with veins 3 and 4 stalked or united.
  Hind wings with vein 4 present.
    Veins 6 and 7 separate.
      Antennæ of male thickened with scales toward base ..... *Walsinghamia.*
      Antennæ of male not thickened with scales.
        Second joint of palpi tufted ..... *Choreutis.*
        Second joint not tufted, but rough scaled.
          Hind wings elongate ovate or narrow oblong ..... *Glyphipteryx.*
          Hind wings short ovate or trigonate ... *Simæthis.*
    Veins 6 and 7 stalked ..... *Scliostoma.*
  Hind wings with vein 4 absent ..... *Yponomeuta.*
Hind wings with veins 3 and 4 separate, rarely connate.
  Palpi not tufted, smooth, upturned.
    Hind wings with the cross-vein of cell strongly angled .. *Mieza.*
    Hind wings with the cross-vein straight.
      Palpi reaching above the middle of the front ..... *Atteva.*
      Palpi not reaching the middle of the front .. *Trichostibas.*
  Palpi with the second joint tufted below or porrect and hairy.
    Third joint smooth, sharp pointed, distinct.
      Veins 6 and 7 of hind wings stalked.
        Veins 7 and 8 of fore wings stalked.
          Apex of fore wings pointed ..... *Cerostoma.*
          Apex of fore wings falcate ..... *Periclymenobius.*
        Veins 7 and 8 of fore wings separate ..... *Trachoma.*
      Veins 6 and 7 of hind wings separate.
        Veins 7 and 8 of fore wings separate ..... *Plutella.*
        Veins 7 and 8 of fore wings stalked ..... *Eido.*
    Third joint concealed in hair or porrect, not smooth.
      Veins 6 and 7 of hind wings stalked ..... *Euceratia.*
      Veins 6 and 7 of hind wings separate.
        Fore wings with 11 veins ..... *Pterolonche.*
        Fore wings with 12 veins.

Veins 9 and 10 stalked ..... *Calantica.*
Veins 9 and 10 separate.
Basal joint of palpi short..... *Arœolepia.*
Basal joint of palpi long..... *? Thelethia.*

Subfamily YPONOMEUTINÆ.

Genus YPONOMEUTA, Latr.

Latr., Gen. Crust. Ins., IV., 222, 1796; *Hyponomeuta*, Sdt., et auct.

Synopsis of Species.

Hind wings above and all wings below shaded with dark gray..... *multipunctella.*
Wings white on both sides..... *orbimaculella.*

Y. multipunctella, Clem., Pr. Acad. Nat. Sci. Phil., 8, 1860; Chamb. Bull. U. S. Geog. Surv., IV., 151, 1878 (refs.): Riley, Smith's List. Lep. Bor. Am., No. 5156; *wakarusa*, Gaumer, Obs. Nat.: Chamb. Bull. IV., 151, 1878; ♂ *ordinatellus*, Walk., Cat. Brit. Mus., XXVIII., 530, 1863.

A specimen of this species in the Nat. Museum has pinned on it a printed slip, cut from a journal, which reads as follows: "On the 25th of May, I obtained from the Wakarusa bottom a large number of very small larvæ that were feeding upon the Waahoo, *Euonymus atropurpureus*. These caterpillars were so small when fully grown that they escaped through the wire-topped cage and made their cocoons in the corners of the room, and, ten days later, they hatched and were captured as they flew in the windows. This is the moth which I have named the Waahoo moth, *Hyponomeuta wakarusa*." Across the face of the slip is written "G. F. Gaumer."

I have nine males, no females, of *multipunctella.*

Y. orbimaculella, Chamb., CAN. ENT., V., 12, 1873; *orbinaculella*, Riley, Smith's List Lep. Bor. Am., No. 5157, 1891: *euonymella*, Chamb., CAN. ENT., IV., 42, 1872; *evonymella*, Chamb., Bull. U. S. Geog. Surv., IV., 150, 1878; ♀ *ordinatellus*, Walk.

This differs from the preceding only in lacking the gray shading. I have seven females, no males, of *orbimaculella*. Both forms, bred from *Euonymus americanus*, Dept. Agriculture, No. 3406, will doubtless prove to be sexes of one species as determined by Walker.

[NOTE.—*Y. apicipunctella*, Chamb., and *Y. Zellerieila*, Chamb., are referable to Psecadia in the Œcophoridæ; *Y. quinquepunctella*, Chamb., to Prodoxus in the Tineidæ.]

Genus Mieza, Walk.

Walk., Cat. Brit. Mus., II., 527, 1854 ; *Enœmia*, Zell., Verhl. Zool.-Bot. Ges. Wien., XXII., 562, 1872 ; XXV., 345, 1875.

Synopsis of Species.

Head white on the vertex.

Fore wings white on basal two-thirds of inner margin, with distinct, round, dark brown spots ....*subfervens.*

Fore wings thickly and uniformly sprinkled with brown streaks, the round dots small and obscure .....*psammitis.*

Head red on vertex ....*igninix.*

M. subfervens, Walk., Cat. Brit. Mus., II., 528, 1854 ; Zell., Verh. Zool.-Bot. Ges. Wien., XXII., 503, 1872 ; Grote, Bull. Buff. Soc., II., 152, 1874.

M. psammitis, Zell., Verh. Zool.-Bot. Ges. Wien., XXII., 562, 1872.

M. igninix, Walk., Cat. Brit. Mus., II., 527, 1854 ; Grote, Bull. Buff. Soc., II., 152, 1874 ; *crassinervella*, Zell., Verh. Zool.-Bot. Ges. Wien., XXII., 563, 1872 ; Packard, Amer. Nat., IV., 229, 1870, pl. 2, fig. 1 (as *Eustixia pupula*) ; Slosson, Journ. N. Y. Ent. Soc., IV., 86, 1896 ; Dyar, Journ. N. Y. Ent. Soc., IV., 87, 1896.

Genus Atteva, Walk.

Walk., Cat. Brit. Mus., II., 526, 1854 ; Wals., Proc. Zool. Soc. Lond., 1897, 112 (full refs. and synon.).

A. aurea, Fitch, 3rd. Rept. Ins. N. Y., 168, 1856 ; Pack., Proc. Ent. Soc. Phil., III., 106, 1864; Stretch, Zyg. Bomb. N. A., 159, 1872 ; *compta*, Clem., Proc. Acad. Nat. Sci. Phil., 251, 1862 ; Grote, Proc. Ent. Soc. Phil., IV., 319, 1865 ; V., 231, 1865 ; Riley, 1st Rept. Ins. Mo., 151, 1868 ; Zell., Stett. Ent. Zeit., XXXII., 178, 1871 ; Wals., Proc. Zool. Soc. Lond., 1897, 112.

The larva feeds on *Ailanthus*.

Lord Walsingham refers *punctella*, *aurea* and *gemmata* to one species, but they certainly seem distinct.

A. gemmata, Grote, Bull. Buff. Soc., I., 93, 1873 ; Wals., Proc. Zool. Soc. Lond., 1897, 113 ; *floridana*, Neum., Can. Ent., XXIII., 123, 1891 ; Dyar, Journ. N. Y. Ent. Soc., V., 48, 1897.

The larva feeds on *Simaruba*.

Genus Trichostibas, Zell.

Zell., Stett. Ent. Zeit., 1863, 150 ; Hor. Ent. Soc. Ross., XIII., 227, 1877 ; Wals., Proc. Zool. Soc. Lond., 1897, 114.

T. calligera, Zell., Hor. Ent. Soc. Ross., XIII., 231, 1877; Wals., Proc. Zool. Soc. Lond., 1891, 533, 547; 1897, 115; *parvula*, Hy. Edw., Pap. I., 80, 1881; Smith's List, Lep. Bor. Am., No. 958, 1891; Kirby, Cat. Lep. Het., I., 86, 1892; Dyar, Journ. N. Y. Ent. Soc., VI., 41, 1898.

Not uncommon in southern Florida. The Nat. Museum has some 25 of the cocoons, which closely resemble Lord Walsingham's description of *T. fumosa*, Zell. (Proc. Zool. Soc., Lond., 1897, 114), except that it is not kidney shaped, but regularly elliptical. The meshes are nearly square, and the stem by which it is suspended runs along the side of the cocoon and projects a little way beyond. The open neck at the posterior end, about the use of which Lord Walsingham seems to have been in doubt, obviously serves as a place to eject the larval cast skin, which has disappeared in all the specimens before me. I found the cocoons on the trunk of a large tree at Miami, Florida. Other specimens are labelled "on fence," Green Cove Springs, Fla. (R. S. Turner); "on Persea, sp.," Cocoanut Grove, Fla. (E. A. Schwarz); Jacksonville, Fla. (W. H. Ashmead).

Subfamily PLUTELLINÆ.

This includes Calantica, Zell.; Euceratia, Wals.; Aræolepia, Wals.; Periclymenobius, Wall.; Trachoma, Wall.; Pterolonche, Zell.; Cerostoma, Latr.; Plutella, Schr. Eido, Chamb., seems also to fall here, though I have no specimens.

These genera stand correctly listed in Smith's list, except that *dubioscila*, Beut. (No. 5198), should be transferred to Plutella, and is, indeed, scarcely to be distinguished from the less strongly marked specimens of *P. cruciferarum*, which are in the collection, bred from turnip. This latter species should be known as *P. maculipennis*, Curt. (see Wals. and Durr., Ent. Mo. Mag., XXXIII, 173, 1897, for full references).

The following species may be added:

Cerostoma Koebelella, n. sp.

Maxillary palpi filiform, labial long, second joint strongly tufted below, third smooth, sharp pointed. On fore wings veins 7 and 8 stalked; on hind wings 3 and 4 approximate, but separate, 6 and 7 long stalked. Head and thorax dark gray; fore wings purplish gray on the half towards inner margin, sprinkled with little irregular clusters of brown black scales; costal half paler, likewise irrorate with darker scales, a luteous band from the middle of the cell to apex, ill-defined and diffuse, irrorate with brown

scales. It is of even width, covering veins 7 and 8; beyond the cell are also two faint luteous streaks over veins 5 and 6. Secondaries and abdomen shining gray. Expanse 18 mm., one male, Placer Co., Cal., Sept., "through C. V. Riley," U. S. Nat. Museum, type No. 4422.

Synopsis of Species of Cerostoma.

Fore wing luteous, this colour predominating.

Smooth, reddish luteous, not irrorate.....*sublucella*, Wals.

Wings irrorate with darker lines and spots.

A dark streak from apex to cell; two black blotches on inner margin, the wing otherwise scarcely strigose....*cervella*, Wals.

No apical streak; fore wing strigose-reticulate, some of the strigæ on internal margin often forming heavy dots.....*subsylvella*, Wals.

Fore wing gray, the luteous not predominating.

A series of three black dashes below the cell and a spot at the end.....*alutianella*, Beut.

No longitudinal black dashes.

A luteous streak from cell to apex.....*Koebelella*, Dyar.

No such streak, at most a luteous ray from the base toward outer margin.....*radiatella*, Don.

Subfamily GLYPHIPTERYGINÆ

Genus SETIOSTOMA, Zell.

Zell., Verh. Zool.-Bot. Ges. Wien., XXV., 324, 1875.

S. xanthobasis, Zell., Verh. Zool.-Bot. Ges. Wien, XXV., 325, 1875.

S. Fernaldella, Riley, Proc. Ent. Soc., Wash., I., 155, 1889.

Genus WALSINGHAMIA, Riley.

Riley, Proc. Ent. Soc., Wash., I, 157, 1889.

W. diva, Riley, Proc. Ent. Soc., Wash., I., 158, 1889.

Genus SIMÆTHIS, Leach.

Leach, in Sam. Comp., 254, 1819; *Brenthia*, Clem., Proc. Acad. Nat. Sci., Phil., 1860, 172.

S. vicarilis, Zell., Verh., Zool.-Bot. Ges., Wien., XXV., 322, 1875.

S. pavonacella, Clem., Proc. Acad. Nat. Sci., XII., 172, 1860; Wals., Proc. Zool. Soc., Lond., 1897, 120 (references).

Lord Walsingham recognizes the genus Brenthia for this species, but it seems to me to fall in Simæthis. The other species of Brenthia fall in Choreutis.

(To be continued.)

NEW SPECIES AND VARIETIES OF NORTH AMERICAN LEPIDOPTERA.

BY WILLIAM BARNES, M. D., DECATUR, ILLINOIS.

Melitæa Chalcedon, ab. *fusimacula*.
Melitæa Chalcedon, ab. *Mariana*.
Melitæa Senrabii, n. sp.
Thecla Mirabelle, n. sp.
Pyrgus Polingii, n. sp.
Pseudalypia Geronimo, n. sp.
Scirarctia Clio, var. *Jessica*, n. var.
Orgyia Oslari, n. sp.
Eulimacodes Telligii, n. sp.
Coloradia Doris, n. sp.
Tolype Glenwoodii, n. sp.
Gloveria Arizonensis, Pack., male.

Melitæa Chalcedon, ab. *fusimacula*. Variations of Chalcedon are very common, but the ones I now describe are so striking that they are certainly worthy of a varietal name, especially as they do not seem to be so very uncommon. In the first of these, to which I have given the name *Fusimacula*, there is a tendency to obliteration of the spots on discs of both wings, and to a fusion of the three outer rows of spots in a horizontal direction. The ground colour of the upper surface is of the same rich black as *Chalcedon*. There is a complete absence of the spots in the cells of both fore and hind wings in males, and there are but faint traces of them in the females. On the fore wings the fusion takes place as follows: The two outer rows unite to form a yellow band, which is joined at about its middle by a yellow demi-band from the costa, which is composed of the fusion of the two inner rows. The infra-cellular spot on the fore wings is either absent or fused with the large spot outside of it, thus forming a large quadrangular patch on the middle of the hind margin. On the hind wings there is more or less complete fusion of the outer three rows of spots, resulting in a broad yellow band across the wing composed of large quadrangular spots three-eighths of an inch long lying between the nervules. There are faint traces of a marginal row of red spots. On the under side the fusion is even more marked. There is almost complete obliteration of the mesial row of red spots on the hind wings. The red markings on the inner third of the hind wings are about the same as in Chalcedon, but the yellow spots have almost or quite disappeared, being replaced by black. Types: three males and two females from California.

Melitæa Chalcedon, ab. *Mariana*.—Upper surface black on both wings, the only markings being, on the fore wings the marginal row of red spots, and in one specimen two faint red spots in cell, and on the hind wings a series of minute yellow spots, representing the mesial row. All

the other spots have disappeared, though in one specimen a few can be discerned through the black. On the under surface the yellow markings have been entirely replaced by black, the red remaining intact. In one specimen the yellow spots can be traced through the black, but in the other there is no sign of them to be seen. The only traces of yellow are a few scales along the veins of the hind wings, a few more at the apex of the fore wings and the spots on the fringes. Types: two males. California.

Melitæa Semrabii, n. sp. Male, upper surface black, with light brick-red markings as follows: Indications of a marginal row of spots as shown by two or three at inner angle of fore wings. In one specimen there are also faint traces of spots on the secondaries. A submarginal row following outer edge of both wings, seven on fore and eight on hind wings, large and distinct. A third row nearly obsolete. The three spots at costal end, yellowish white. Two narrow bars in cell and four or five small irregular spots below and to inner side of them, on the primaries. On inner half of hind wings, two short transverse bars from costal edge with a round spot below and between them. Traces of one or two other spots. Under surface of primaries has a marginal band of red divided by black veins. Within this is a row of white spots, fading out at inner angle, heavily margined by black internally, and lightly externally. The third row is composed of large red spots corresponding to the prominent row on the upper surface. A demi-band from costa joins this at its middle. The spots on the demi-band are four or five in number and of a yellowish tinge. The remainder of the wing is red, and has four black bands from costa; the inner extending across wing, the outer three only half way. Hind wings have a marginal, a basal and a double mesial row of white spots margined with black. There is also a white spot in disc, margined with black. The rest of the wing is red. Thorax and abdomen, black above, whitish beneath. Antennæ black with light rings at joints. Expanse, male, seven-eighths inch. Types: two males. Corpus Christi, Texas.

Thecla Mirabelle, n. sp.—Compared to Autolycus, Edw., to which it is closely allied, and of which it may prove a variety, the apex of fore wings is more acute and the inner angle more retracted, and the discal mark is broader. The fulvous patch is not so sharply defined and more rounded. The anal angle of the hind wings is much more acute and the outer margin not so rounded. There is almost no trace of the tooth

marking the position of the upper tail. The fulvous patch extends inward towards the base of the wing instead of following the outer margin, and merges gradually into the ground colour of the wing, which is not so dark as in Autolycus, being more of a yellowish brown. Under side more of a light yellowish brown than fawn colour. The marginal row of crescents is wanting, and the discal macular row of spots is very indistinct. The black spots at anal angle faint. Fulvous lunules obsolete, except one in third space from anal angle and a few scales in the fourth space. Blue patch in third space, though faint. Types: one male from Utah and one female with California label, for the accuracy of which, however, I cannot vouch, as I received it from a dealer. I am inclined to regard this as a desert form of Autolycus, but until its position can be settled by more material, it may be regarded as distinct.

Pyrgus Polingii, n. sp.—Expanse, one inch. Upper surface brownish black. Fringes fuscous. Marked with small while dots as follows: Three subapical, close together in a row from costa, the middle one minute, one in cell, three in a longitudinal row below cell, the middle one largest, separated about one-sixteenth of an inch from inner margin, one faint, one close to inner margin a little beyond middle. On secondaries is a mesial curved row of three or four parallel to margin. Under surface disc of primaries blackish brown, costa and outer fourth considerably lighter, more of a yellowish brown, inner margin grayish. Inner two-thirds of secondaries dark brown, outer third yellowish brown. Spots on under surface as above, only larger, and an additional spot in cell on secondaries. Head, thorax and abdomen blackish brown above, fuscous beneath. Antennæ blackish above, joints narrowly yellowish white, tip yellowish brown, beneath tip and base of club brownish, medium portion yellowish, shaft brown ringed with yellow. Types: four males, four females. Huachuca Mountains, Arizona. July.

Pseudalypia Geronimo, n. sp.—Upper surface black with a slight brownish reflection which is more marked on secondaries. Fringes a shade lighter. Secondaries without markings. Two large quadrangular light yellow spots on primaries, forming a band across wing from costal edge at junction of middle and outer thirds to inner angle. To the inner side of the costal spot is a narrow band of bluish metallic scales. With a lens the brownish lustre to the wings is shown to be due to a sprinkling of bronze metallic scales over the black ground colour. In one specimen there are a few yellowish scales in the region of the discal dot, and a few

bluish scales along some of the veins. Probably in fresher specimens these would be more marked. Under surface lacks the bluish markings, otherwise as above. Head, thorax, and abdomen black above and below, showing, however, with lens some metallic effects. Legs black; but hairs on inner aspect, especially on posterior pair, orange. Palpi dark above, fuscous beneath. Tongue yellow. Antennæ black, tending to fuscous at tip and on under side. Eyes show bright metallic, brassy shades. There is a tuft of bright orange hairs at base of primaries on under side. Expanse, one and one-half inches. Types: four males and one female. Huachuca Mountains, Arizona. July and August.

Seirarctia Clio, var. Jessica, n. var.—Differs from type form in having hind wings almost or entirely black. In the males the suffusion of the hind wings with black is complete, while in the females it is only partially so, there remaining small patches of the white, especially along outer margin and costa. The veins of fore wings are also much more heavily lined with black. There is a well-marked black edging to the inner, outer and costal margins of fore wings of the males as well as the outer margin of secondaries of both sexes. In one female the outer margin of primaries also has the black edging. The under surface of primaries in the males is almost entirely suffused with black, while the secondaries as on the upper surface are entirely so. In the females this suffusion is much less marked. I have only seen this variety from Glenwood Springs, Colorado. The typical Clio I have from Salida and Durango, Colorado, and Nogales, Arizona.

Orgyia Oslari, n. sp.—Male expanse, one and one-sixteenth inches. Fore wings light yellowish brown. The ground colour is, however, largely covered over with a darker brown shade. Basal line black, distinct. T. a. line curved evenly outward from costa to middle of wing, then inward to inner margin where it approaches close to t. p. line, black, distinct; outer margin a little undulate, inner accompanied by a blackish shade, which quite fills the concavity of the curve at the costal end. T. p. line crenulate, black, distinct; beginning at costa, it extends downward and outward in a straight line to the third nervule, opposite reniform spot, where, forming an obtuse angle, it proceeds in a gentle curve around the cell and then inward to inner margin. It is accompanied by a blackish shade on the inner side of costal half. The limbal space is obscured in its outer or marginal half by a brownish shade, and has three small intervenular black dashes opposite cell. There is also a

black blotch on costa, just above the angle of the t. p. line, and a white spot above inner angle. The costa of the limbal region is darker than elsewhere. Reniform concolorous, surrounded by ring of blackish scales. Orbicular obscured by the shade accompanying t. a. line. Hind wings blackish brown, same as the darker shades of fore wings. Fringes concolorous. Under surface of both wings have a marginal band about one-eighth of an inch wide, of a light yellowish brown. The remainder of wings to the base of a dark blackish brown. Antennæ and thorax light brown. Abdomen a little darker. Types: one male. Poncha Springs, Colorado. July 5th.

Eulimacodes Telligii, n. sp.—Fore wings marked by a conspicuous triangular silver patch. The base of this is about one-sixteenth of an inch above the inner margin and extends with a very slight downward tendency from the middle of the base of wing to above the inner angle. The silver here gradually fades out, but the continuation of the line in a broad, easy curve to the apex is marked by some blackish scales. The upper edge of the patch ascends steeply, from the middle of base of wing to near costal margin at its inner fourth, thence rounding off the apex of the triangle it descends in a rather steep curve and joins the base line above the inner angle. The wing above the silver mark, and its continuation, is of a rich golden brown, smooth and glistening, a little darker on disc and next to the silver patch. The rest of the wing below and to the outer side of the mark, together with the whole of the secondaries, is of a dull brown, a couple of shades lighter than the fore wings. Fringes, thorax and abdomen concolorous with hind wings. Under surface of both wings of a uniform light brown of same shade as secondaries above. Type: one female. Huachuca Mountains, Arizona. July 20th.

Coloradia Doris, n. sp.—Male expanse, two and one-fourth inches. Compared to Pandora, the wings are much less heavily scaled, the hind wings being quite translucent. The markings of primaries are much fainter and there is much less of the white shading. The t. a. line presents quite an even outward curve not approaching the discal spot. In Pandora this line is very prominently toothed and in some of the specimens one of the teeth extends to and is more or less completely fused with the spot. T. p. line evenly dentate, closer to margin of wing than in Pandora. S. t. line very faintly indicated. Hind wings translucent, almost no trace of the median and submarginal bands. Inner margin covered with long pinkish hairs as in Pandora. Fringes of both

wings black. The white spots at ends of veins faint. Discal spots oblong instead of round ; not so prominent as in Pandora. Under side very thinly scaled. Markings as above, only very faint.

Female expanse, two and five-eighths inches. Dull, smoky brown, dusted with white between t. p. and t. a. lines on primaries, otherwise very uniform over both wings. Lines as in male, but still fainter. Under side same colour, somewhat pinkish at bases of wings. T. p. line very faintly indicated : otherwise, except the discal spots, there are no markings. Types : two males, one female, in my collection from Salida and Glenwood Springs, Colorado.

Tolype Glenwoodii, n. sp.—That there are two species confused under the name of Distincta, French, I have been convinced for a long time. On showing them to Prof. French recently, when he was visiting me, he was very positive as regards their distinctness. Prof. Dyar, to whom I sent a pair of each for an opinion, regards them as mere varieties, on the grounds that he finds no constant marks of distinction between them. I have before me a series of eight pairs of Distincta and eight males and two females of Glenwoodii, and while constant differences in maculation of the two are rather hard to describe, yet there are points which seem to me to prove their distinctness beyond a doubt. Glenwoodii is a much broader-winged insect, by measurement the fore wings of the female being one-sixteenth of an inch broader than the females of Distincta. The thorax is apparently much larger. This is partially at least due to the greater development of the hairy vestiture. In the two females before me the abdomen does not protrude beyond the wings, while in all the female Distinctas it does to the extent of from one-eight to one-fourth inch. The whole insect is heavier and more robust, shorter, broader winged, while Distincta is slighter and more trimly built, with rather long, narrow wings. In colour the Distinctas are all decidedly gray, in only two females does there seem to be a tendency to white on the thorax. The Glenwoodiis are all of a very light gray, almost pure white on the thorax. The hind wings are quite distinct in the two species. In the new one they present a well-marked, banded appearance, the bands being distinct and quite sharply defined. The marginal band is light and narrow. The submarginal quite dark and broad. The mesial band is of about the same width, and light. Within this the wing is dark, but lightens somewhat towards base. In Distincta these bands merge gradually into each other, there being much less

contrast in the two shades. The general effect is blurred and indistinct. On the fore wings, while there are no marked differences in the transverse lines, yet in Distincta they seem narrower, neater, and give a more trim, clear cut appearance to the wings. The two teeth in the middle of the marginal white line are much more distinct in the old species, they being scarcely discernible in some of the specimens of the new. The t. a. line in Distincta proceeds directly to costa, while in the new species it turns inward just below costa and joins it at an acute angle. In other respects the maculation is practically the same. The examples on which the above comparative description is based were taken at Glenwood Springs, Colorado, in August, September, and October. Types in my collection, and also in National Museum.

Gloveria Arizonensis, Pack. Male.—Females of this species are quite common, coming freely to light. The male, however, has never been described, and so far as I know the two before me are the only ones ever taken. They differ so much from the females that I have made the following description of them: Expanse, two and three-fourths inches, thus being considerably smaller than the females, which average three and one-half inches. Maculation brighter and more distinct than in female: the contrasting light and dark blackish gray shades bringing out the transverse lines in strong relief. Basal space light gray, central portion obscured by a dark shade. Median space mostly dark, only the costa and infra-cellular parts being somewhat lighter. T. p. line accompanied by an outer shade, slightly separated from it by a light gray band. The remainder of the subterminal space is the lightest portion of the wing and is thinly scaled and quite translucent. Terminal space even dark gray, sharply defined by the prominent s. t. line and strongly contrasting with the subterminal space. Discal dot white, distinct. Hind wings ochraceous, costal and outer margins obscured by dusky shade. Veins of both wings dark gray. Fringe of hind wings fuscous, of fore wings concolorous. Head and abdomen ochraceous. Thorax dark gray anteriorly, shading into ochraceous posteriorly. Antennæ dark brown. Beneath: hind wings as above. Fore wings, cellular region and along costa to apex, as well as terminal area, dark; the rest of the wing light semi-translucent. Types: two specimens from Glenwood Springs, Colorado; taken in July and August.

FOUR NEW SPECIES OF PLATYMETOPIUS.

BY C. F. BAKER, ST. LOUIS, MO.

Platymetopius ornatus, n. sp.

Length, ♂, 5.25 mm., of which the head occupies 1 mm.; width across base of elytra a little more than 1 mm. Vertex rather strongly obtusely angulate; width between eyes three-fourths the length at middle, which is more than twice length at eyes; the disc is evenly slightly convex. Face, viewed from the side, straight. Pronotal width two and a half times the length; the length little more than three-eights that of vertex. Pronotum about as broad as head, the anterior margin an even curve.

Colour pale yellowish; below brighter and unicolorous, except for a few dark arcs on summit of front. Vertex with a double dark spot at tip and three abbreviated dark transverse bands crossing the median line at equal intervals back of it. Pronotum with two abbreviated transverse lines anteriorly, and several irregular dark markings laterally. Scutel with the transverse impressed line black and having each end connected with the base by a black band. Elytra smoky, back of the transverse veins with many small white spots, and three larger ones on the costa in the vicinity of the recurved costal nervures; membrane clear smoky. Valve not exserted, plates small, broad at base, suddenly narrowed beyond middle into slender acute points.

Described from one male in the National Museum; taken at Horace, Kansas, July 28, 1891.

Platymetopius Oregonensis, n. sp.

Length, ♂, 5 mm. Head rather short and distinctly narrower than pronotum. Vertex rather acutely angulate; width between eyes two-thirds the length at middle, which is about twice the length at eyes; disc broadly subsulcate medially. Face, viewed from side, nearly straight, very slightly concave above. Width of pronotum two and one-third times the length, the latter five-sevenths that of vertex; the anterior margin of pronotum recurved behind eyes.

Colour ferruginous, paler below, where there are no dark markings except a few faint arcs on summit of front. Vertex with a small light dash at apex; its disc, together with the pronotum and elytra, minutely irrorate. Elytra with a few small round white or hyaline spots scattered over the surface; partially transparent along costa and around apex; one or more of the inner apical veins dark. Valve very large and bluntly

triangular. Plates twice the length of valve, tapering to narrow points, the sides incurved at middle.

Described from two males, one collected at Ashland, Ore., the other at Portland, Ore., both during September, 1897, by Prof. A. P. Morse. Near *acutus*, but the vertex is shorter, the pronotum without light vittæ, the elytra with fewer white spots, and colour beneath much lighter.

Platymetopius tenuifrons, n. sp.

Length, ♂, 5.5 mm. Head long, unusually narrowed beyond the eyes, and distinctly narrower than pronotum. Vertex strongly produced, suddenly narrowed beyond eyes, point blunt; width between eyes about half length at middle; disc broadly medially sulcate. Face, viewed from side, strongly concave above. Pronotal width two and one-fourth times the length, the latter less than two-thirds that of the vertex. Anterior margin of pronotum recurved behind eyes.

Colour ferruginous, thickly and very finely irrorate throughout, including the face, which is darkened towards its summit. Point of vertex with a black dot on either side of tip. Scutel with a faint white longitudinal line on either side. Elytra with one or two small round white spots in each of the cells back of apical; the apical veins and about twelve recurved nervures darkened. Valve large, broadly rounded behind. Plates short, about as long as valve, and rapidly narrowed to acute points.

Described from one male in the Herbert H. Smith collection, taken at Chapada, Brazil, in May. Resembles *fuscifrons* in the deeply coloured face, but is much larger and with a far longer vertex, besides differing otherwise.

Platymetopius latus, n. sp.

Length, ♀, 5 mm. Vertex very long, as long as twice the width between eyes, the median sulcus becoming very broad towards tip.

Colour clear pale ferruginous, below with the entire face paler. Sulcus on vertex darkened by fine longitudinal vermiculations. Pronotum, scutel and most of elytra unicolorous, without markings of any sort, except a few fine brown dots in internal apical cells of elytra, and about eight small recurved brown dashes along costa. Legs entirely without markings. Last ventral segment twice length of preceding, the hind margin rather narrowly, but evenly, rounded.

Described from a single female collected by myself in the foothills near Fort Collins, Colorado. This species is nearest *acutus*, but has a much longer vertex, entirely lacks any markings on pronotum or disc of elytra, and has the elytra more widely flaring at the sides than in that species.

THE PURSLANE SAW-FLY—SCHIZOCERUS ZABRISKEI, ASHM., MS.*

BY F. M. WEBSTER AND C. W. MALLY, WOOSTER, OHIO.

Just when this species first became abundant in Ohio we are unable to say, but it was not until June, 1898, that we began a study of its habits. The insect is quite generally distributed in Ohio, as we have observed it at Alliance, Wooster, Tiffin, Fremont, and Clyde, and perhaps over the eastern and western parts of the United States, as it is found at Washington, D. C., where Dr. Chittenden is making a careful study of it, and Mr. Mally observed it in abundance in the summer of 1899, at Des Moines, Iowa.

We have been informed that the species has been described by Mr. Ashmead in a paper to be published "shortly."

Here at Wooster, not a plant could be found that was not infested, including all plants in the greenhouse, by July 1, 1898. It is quite effective in checking the purslane, in many places the plants not developing seed, due to the destruction of the leaves.

The eggs are deposited in the edge of the leaves, deposition usually being completed in ten to fifteen seconds. In no case was a female observed to deposit on the flat surface of the leaf, or on the stem. As soon as hatched the larvæ begin to feed on the leaf, and ultimately mine out the greater part of the pulpy substance, but never eat through the surface until driven to do so from lack of food, when they emerge and make their way to a fresh leaf, immediately enter and continue their mining habit, apparently not feeding on the surface at all, except as they cut their way into the leaf. In numerous instances, where the obtainable leaves had all been exhausted, the larvæ bored downward in the stems of the plant. The larvæ do not drop readily from the surface of the plant, and, when handled with forceps or needle, they exude a clear viscid substance which holds them in place.

When fully developed, the larvæ enter the ground to the depth of one-half to one inch and form a silken cocoon, to which bits of soil adhere quite firmly, and there transform. The pupa stage lasts only about seven days, when the adults emerge, a few males in advance, soon after which the sexes pair and oviposit.

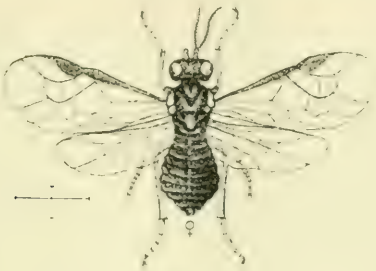
In nine cases out of ten distinct experiments in the insectary, in rearing the adults, the time of the larva entering the soil, and the

* Read before the Ohio Academy of Science, December 22, 1899.

emergence of the adult, was within a few hours of seven days, and in the other case the time was a few hours over eight days. An observation by Mr. Mally on the actual time passed in the pupa shows that a larva descending into the ground at 5:00 p. m. had formed the cocoon by 5:00 p. m. the next day, and was still in the larval state the second day. The exact length of time required in the different stages has not been determined, but the entire cycle is complete in about three weeks, thus making probably six generations in a year.

During the summer of 1899, commencing June 6, a series of breeding experiments was carried on, out of doors, with plants grown in breeding cages, upon which each generation was colonized. During May purslane plants were transplanted from the insectary to the garden, with a view of thus attracting the earliest appearing adults. On June 5 larvæ were noticed in abundance, not only in these trap plants, but also in larger plants growing promiscuously in favored spots, one very small individual being observed in an adjoining garden on a very young plant, these larvæ clearly representing the earliest generation of the season. The trap plants were covered immediately with a breeding cage, and on June 15 a number of adults, all females, were observed in the cage. Nine of these females were transferred to cage No. 2, upon plants that had been brought from the insectary, and in which no larvæ were working. Two males and two additional females were captured in the field, and also placed in this cage, which then contained in all eleven females and two males. One of these females was observed to oviposit in the leaves. On June 22 the very young larvæ were first observed beginning to feed in the leaves. July 5 the first adult, a female, was observed, evidently having just emerged. It is an interesting fact that though this female was just drying her wings, several males were observed hovering about the cage in vain effort to effect an entrance. July 7 three females and ten males from the cage were placed in cage No. 3, provided with plants obtained from the same source as the preceding. July 14 quite a number of larvæ were observed in this cage working in the leaves. July 28 adults were observed. On the 29th three females and six males were placed in cage No. 4. August 16 two males were observed in this cage. As these males marked the generation, three females and one male were taken from cage No. 3 and placed in cage No. 5. On September 5 one female was observed in this cage, and determines the fifth generation, but up to September 15 it had been im-

possible to secure males outside, as not an individual of either sex could be found. But on September 18 a number of larvæ, varying in size from very small ones to those fairly well developed, were observed in plants in the near vicinity. These plants were transferred to a breeding cage. The larvæ disappeared, and, as they could not escape from the cage, they must have either entered the ground or perished from lack of food.



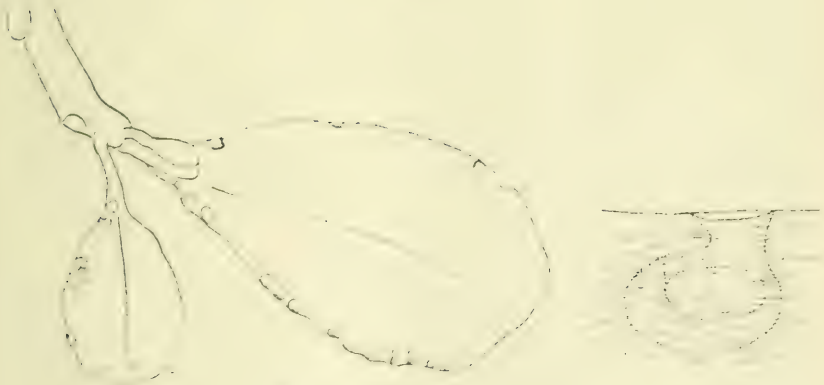


Fig. 3.

as might have been the case with the younger, on account of severe frost and freeze September 26, which killed the plants.

On September 30, 1898, quite an extensive search was made for adult sawflies, but none could be found. Found numerous larvæ, varying from real young to full-grown individuals. Numerous adult parasites were found also. The frost killed the plants about this time, thus closing the breeding season.

In the light of these two records it may be said that the exact number of broods for any given year may depend on the date of occurrence of the earliest killing frosts.

The sudden and almost total disappearance of this species during the latter part of August and first of September was undoubtedly mainly due to the immense numbers of a parasitic species, which Mr. Ashmead has determined as belonging to the genus *Ichneutes*, and probably new to science.

An interesting observation was made in connection with a large breeding cage out of doors, for the purpose of breeding parasites. The adult sawflies began emerging in great numbers, and, to our surprise, were found almost swarming on the outside of the cage. Our first impression was that the cage was imperfect at some point, and that they were making their escape, but such was not the case. On examination we found that the specimens on the outside were all males, evidently attracted by the females in the cage. There were no purslane plants to amount to anything within two or three rods of the cage, but at a distance of five or six rods, in two directions, were garden patches well stocked with purslane and larvæ, furnishing an abundance of sawflies.

During the summer of 1898 a female, with a male antenna, was found in one of the breeding cages. A notice on this, written by Mr. Mally, appears in the seventh annual report of the Ohio State Academy of Science, pp. 34 and 35, illustrated by the accompanying figure (Fig. 1). The oviposition is shown in Fig. 2, place of eggs in leaf; and Fig. 3, egg in position.

A POPULAR NAME FOR CLISIOCAMPA DISSTRIA.

Sir,—I am much interested in Mr. Slingerland's note on the new popular name for *Clisiocampa disstria* in the Canadian Entomologist for January. I once wrote an editorial for "Insect Life" on popular names (Vol. VII., pp. 363, 364), in which I gave utterance to a certain distaste for "book names" and to a preference for the popular name which grows up among the people. Such names are rarely specifically distinctive, but they are usually catchy, frequently phonetic, and more or less descriptive.

I am not sure that we have any legitimate popular name for the forest tent caterpillar. The one just mentioned is obviously a book name

derived from the popular name of its nearest relative, the orchard tent caterpillar, but it is misleading, as Mr. Slingerland points out, since the larva of *Clisiocampa disstria* does not make a tent. It is interesting to know that the sympathetic and altogether united organization known as the "Jugatæ" has not falsified its name in this instance, but has joined with Mr. Slingerland in concluding that the "forest tentless caterpillar" would be an appropriate name for this species.

Since Mr. Slingerland invites suggestions, it occurs to the writer that there are so many hundreds of other forest caterpillars which are tentless that the name lacks the specific quality which is desirable. In answer to his question, "Has anyone a better name to suggest?" I might propose "the tin-horn caterpillar," or "the brass-band caterpillar," referring to the startling discoveries which were made in south-western New York last summer, and which, the writer is informed, Mr. Slingerland intends to investigate next season. Alternatively, the name "the railroad-train obstructor," or "the slippery-when-smashed caterpillar," might be suggested, since this is the species which is at the bottom of all the newspaper stories of railway trains being stopped by caterpillars. Or, since the damage of the last few years is said to have seriously reduced the crop of maple sugar, the insect might be called "the maple sugar adulteration-promoter."

Seriously, however, why would not "forest army worm," or "the army worm of the forest," be quite the most appropriate and distinctive name which could be suggested?

L. O. Howard, Washington, D. C.

Mr. C. W. Mally, M. Sc., assistant to Professor F. M. Webster in the Entomological Department of the Ohio Agricultural Experiment Station, has been appointed Assistant Government Entomologist of Cape Colony, South Africa, and has left for his distant sphere of labour. Mr Chas. P. Lounsbury, who also went from the United States a few years ago, is in charge of the Entomological Department at Cape Town.

THE DESTRUCTIVE GREEN-PEA LOUSE.

BY WILLIS G. JOHNSON, COLLEGE PARK, MD.

Perhaps never in the history of economic entomology has an undescribed species of insect appeared so suddenly and over such a wide area, and in such destructive numbers, as the "destructive green-pea louse," the popular name I have given the insect herein described. It has occurred, during the past season, in Maryland, Delaware, Virginia, North Carolina, Pennsylvania, New Jersey, New York (Long Island), Connecticut, Vermont, Maine, Ohio, and Canada (Ottawa).

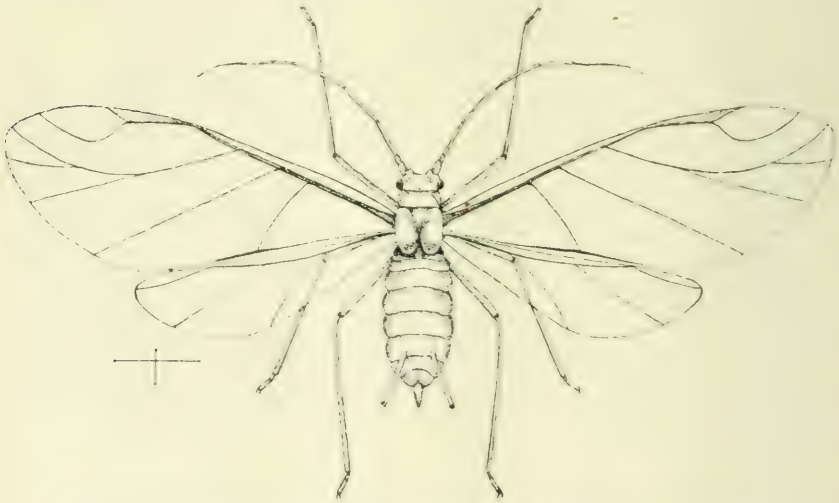


FIG. 4.—*Nectarophora destructor*, winged form. A typical representation. (Original.)

It belongs to the family Aphididæ, and the familiar and extensively-used genus Siphonophora. Unfortunately, however, Koch overlooked the fact that Siphonophora, as a generic term, was already appropriated for the Myriapoda before he made use of it in his Aphididæ; it is also used to denote an order of the oceanic Hydrozoa. In accordance with modern practice, therefore, it is fitting that we should drop the name Siphonophora and recognize some other. In his synopsis of the Aphididæ of Minnesota, O. W. Oestlund proposes the name Nectarophora to take the place of Siphonophora. I see no reason why it should not stand, and place the species described below under that generic name.

FIG. 5.—*Nectarophora destructor*, apterous form. (Original.)

FIG. 6.—*Nectarophora destructor* and its principal enemy, *Allograpta obliqua*: *a*, pupa on leaf; *b*, adult; *c*, larva; *d*, larva feeding; *e*, *Bassus lætorius* (female). Hair lines represent natural size. (Original.)

Nectarophora destructor, n. sp.—The general colour of both winged and wingless individuals is green; conforming so closely to that of the pea plant itself, we might, perhaps, better call it pea-green. The colour, however, varies slightly with the age of the insects: the young when first born are lighter, still bordering the greenish shade of the adult; old or spent females are lighter, some having a greenish-yellow tinge. In many instances individuals in a colony will be seen of a yellowish or creamy tinge. Such individuals are usually affected with a fungous disease. The variation in colour may, therefore, in many instances be attributed to some abnormal condition.

The general form of the body in both winged and wingless specimens is elongate and fusiform, the latter being slightly the larger. The average length of the body in both forms is about 4.50 mm. Eyes are red and prominent; colour showing conspicuously in specimens mounted in Canada balsam. Antennæ lighter than body; tubercle prominent; joints darker than rest of segment; seventh joint quite filiform and fuscous. Legs long and conspicuous; tarsi, distal ends of tibia and femora fuscous. Honey-tubes fuscous at tips, otherwise concolorous with body.

Winged Female.—Colour pea-green. Fore wing about 5 mm. from tip to base and about 2 mm. wide at broadest part: entire wing expanse about 11 mm. Length of body, including style, generally 4 to 5 mm.; some cases where the female is distended with young the length is 6 mm. Width of body varies from 1 to 1.50 mm., depending on condition of specimen. Antennæ long and slender, reaching to or slightly beyond the tip of the style; first and second joints short and closely joined to tubercle; other joints vary slightly; the following measurements represent the general average of a long series: III. 1.50 mm., IV. 1.00 mm., V. 0.75 mm., VI. 0.50 mm., VII. 1.50 mm. Wings transparent, veins slender, typically represented in Fig. 4. Honey-tubes long, slender and cylindrical, extending beyond the tip of the abdomen, in some cases to the tip of the style; they are usually about one-fifth the length of the body, varying from 1.00 mm. to 1.50 mm. Style conspicuous, about half the length of honey-tubes.

Apterous Female.—As a rule, slightly larger than the winged female. Colour pea-green. Body slightly more elongate and fusiform than winged specimens; length varying from 4 to 6 mm.; width varying from 1 to 2 mm. Antennæ reaching beyond the tip of the style; length of

joints varying considerably. Honey-tubes same general shape as in winged specimen, but longer, extending beyond the tip of the style; length varying from 1.25 mm. to 2 mm. Style longer and more nearly conical than in winged individuals. Typical form of apterous female is shown in Fig. 5.

Described from many living and dead viviparous females of both forms from Maryland, New Jersey, Connecticut, Ohio, and Ottawa, Canada. Found on green field pea, sweet peas, and kept for a time on clover. Types in formalin and alcohol deposited in the U. S. National Museum.

General Notes.—I have given this insect much study during the past season, and still have a colony under observation (Jan. 29, 1900) in my laboratory. There is no cessation of the reproduction of young. As yet we have not been able to obtain eggs of the species, although several hundred mature apterous females were collected just before our coldest weather late in December and placed in tubes. We also made field observations late in December, and while we had no difficulty in finding the insects close to the ground on the under side of the leaves of volunteer peas, we are still in doubt as to how it passes the winter. I am of the opinion that, under favorable conditions, the female will continue to reproduce young throughout the winter. That the species will survive severe freezing and reproduce later was conclusively tested in our laboratory. A colony upon a bunch of peas in water were frozen late in December so that there was ice half an inch thick in the cup. A week later, when heat was again turned on the building, the insects became active and commenced reproduction a few days later.

Thomas reports a similar case. He observed the wheat-plant louse (*Nectarophora avenæ*) breeding in mid-winter, and took specimens from wheat while the snow was on the ground.

There is also a probability that the late apterous females deposit eggs. Mr. W. H. Ashmead tells me he has frequently seen the eggs of an allied species, which is abundant on tulip trees about Washington. The eggs are usually deposited about the base of the leaf buds.

In my breeding experiments and field observations, I have been struck with the seeming absence of hymenopterous parasites upon this insect. Such a condition is quite uncommon where there is such an abundance of plant lice, for, as a rule, they abound. I have bred but a single hymenopterous parasite, *Lysiphlebus testaceipes* (Cress.), Fab., shown in Fig.

6 at *e*, and this is supposed to be parasitic upon the Syrphus larvæ. In Canada, Dr. James Fletcher informs me he has bred *Praon cerasaphis* and *Aphidius Fletcheri*, a new species recently described by Ashmead; while in Delaware, Professor E. Dwight Sanderson has bred another species of the genus *Aphidius*, namely, *A. Washingtonensis*, from the destructive green-pea louse.

In my field observations I have found the predaceous insects very important factors in the destruction of this plant louse. I have observed four groups of insects at work upon them: First, and most important, the Syrphus flies; second, lady beetles; third, lace winged flies; and fourth, soldier beetles.

Of the Syrphus flies, we bred *Allograpta obliqua*, Say; *Syrphus Americanus*, Weid., and *Sphærophoria cylindrica*, Say. The first named was by far the most abundant and important species. On a farm where 600 acres were planted in peas, and where the plant louse totally destroyed 480 acres, the larvæ of *A. obliqua* so completely destroyed the plant lice by the second week in June that hardly a specimen could be found. In the language of the proprietor, who owns a large cannery, he says: "The last few days I packed, the separator sieved out about 25 bushels of green worms, which no doubt proves they destroyed the plant lice." These "green worms" were the larvæ of *A. obliqua*, illustrated in Fig. 6. The other two species were not so abundant.

Of the lady beetles the most important were *Coccinella 9-notata*, *Hippodamia convergens*, *Megilla maculata* and *Coccinella sanguinea*.

The larvæ of *Chrysopa oculata*, Say, were also abundant upon the infested vines. I observed the soldier beetle, *Podabrus rugulosus*, Lec., feeding voraciously upon the plant lice.

From what I have seen of the ravages produced by the destructive green-pea louse, and our inability to combat it on a large scale, I consider it one of the most important pests on the already long list of noxious insects. Whether it will appear again next year over the same general territory on the field pea remains to be seen; but I am of the opinion it will not be as destructive as the season just past. The superabundance of Syrphus flies and lady beetles over certain areas will certainly have a balancing effect in nature.

Mailed February 9th, 1900.

Fig. 1.

Fig. 4.

Fig. 2.

Fig. 3.

Fig. 5.

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HYDRŒCIA STRAMENTOSA, GUEN.

Plate 2, Fig. 5, nearly twice natural size.—I here copy in full the description of the species, as given by Dr. J. B. Smith in his recent revision of the genus Hydrœcia, in the Transactions of the American Entomological Society, Vol. 26, May, 1899. Also his remarks on and about this interesting species.

"*Hydrœcia Stramentosa*, Gn.—1852—Gn., Spec. Gen. Noct. 1, 129, pl. 6, F. 2. *Hydrœcia.*

"Ground colour a rather dull luteous, with a dash of olivaceous. Collar with a narrow brown line above the middle, the tip distinctly smoky, as are also the tips of the thoracic tuftings. Edges of the patagiæ marked with smoky brown, which is particularly well marked at tip. Sometimes the entire thorax is darker, and in such cases the contrasts between the ground colour and the markings just described are not great. The abdominal tuftings at the base are also dark. The primaries have a reddish shade over the costal region extending to the tip. The outer portion of the median space is distinctly darker, olivaceous, and stands out quite evidently from the rest of the wing. The basal line is geminate, fairly well marked on the costa, then broken and only marked as a spot below that point. T. a. line geminate, the inner line scarcely traceable below the cell: as a whole it is nearly upright, but is inwardly curved through the cell and has a very feeble outcurve below that point. T. p. line very even, rather abruptly bent on the costa, a little outcurved over the reniform, and then evenly oblique inwardly to the inner margin. S. t. line irregular, brownish or smoky, marked by a preceding shade in

the costal region, and beyond that by dusky scales arranged quite regularly. There is an even line at the base of the fringes, which are dusky at tip and have a reddish shade toward the base. The median shade line is well marked on the costa and is blackish to the median vein; below that point it is olive-green and hardly darker than the shading of the outer part of the median space. In the costal region, between the outer part of the basal line and inner portion of the t. a. line, there is a blackish shading, and a similar, though much less marked, shading extends from the inception of the t. a. to the median shade line. The ordinary spots are well marked; the claviform is slightly soiled, olivaceous in colour. Orbicular almost upright, irregularly oval, of the ground colour or a little paler, outlined in olivaceous. Reniform upright, oblong, the angles pointed, hardly constricted in the centre. It is of the ground colour, or may have a slightly reddish tinge. Secondaries pale yellowish, without obvious markings. Beneath yellowish, both wings with a smoky outer line, which, in the specimens before me, does not extend across the wing. Expanse 1.68–1.72 in.; 42–43 mm.

"Hab.—Glenwood Springs, Colorado, September 10th, October 1st, foothills near Denver. 'Middle and Central States, New York, Illinois.'

"Three specimens have been under examination, and I have seen others. None of them, however, are from the East. There is a question, perhaps, whether this species is correctly identified. The examples before me agree with Guenée's figure and description, and I cannot remember having seen any species from the east which might be fitted to them. While I saw the type in the British Museum some years ago, my recollection does not serve sufficiently well to enable me to say whether or not this is really his species. I believe it to be so, and that probably in his original description, the locality, 'New York,' was an error. The other localities given in my Catalogue followed Mr. Grote's notes. I have never seen any specimens of *Stramentosa* identified by Mr. Grote. The specimens before me are all very much alike, and they are evidently related to *Immanis*."

The disclosure that *H. Stramentosa*, Gn., has been taken regularly at Montreal for years past by collectors connected with the Branch of the Ent. Soc. of Ont. there, is in great measure a re-discovery of the species in the East, apparently none knowing of its existence there except themselves. It appears in the early printed lists of our Society as an

Apamea, and I, being desirous of obtaining an example for the Society's collection, enquired of correspondents who I thought were likely to know, but none of them had ever seen it, or could give any information about it. There is an insect in the D'Urban collection which was made in Quebec, labeled *Hydraecia Stramentosa*, in Walker's handwriting, but it does not even belong to that genus. And when I read Dr. Smith's remarks, quoted above, I concluded that it had got into our list by mistake, and that it was not to be looked for in Canada. But one is always liable to find cause to change their conclusions.

Having received some material from Montreal for names, there was amongst it a fresh, bright orange-yellow specimen of *Hydraecia* with purple bands, which so closely resembled the *purpurifascia* in our drawers, that, without giving it critical examination, I placed that name opposite its number. When the specimens were returned, Mr. Brainerd objected to that name; not that he claimed to be able to distinguish the species, but he thought there was not enough of the food-plant of *purpurifascia* about Montreal to feed a tithe of the moths that could be taken there, remarking that they had been calling it *rutila*, and suspected that I must be wrong. Being so different in colour from all the *rutilas* I had seen, I hesitated to accept it as such; so obtaining another specimen, I referred it to Dr. Smith, who pronounced it to be "a very typical specimen of that species." When I informed Mr. Brainerd of the decision being in his favour, I requested from him another specimen if he could spare it, which he kindly sent, and said, "With it I put one of what we call *Stramentosa*, which is the only other common species here except *Nictitans*," which proved to be the true *H. Stramentosa*, Guenée, and thus, by a fortunate error on my part, has its presence there been disclosed to the rest of the Entomological world.

When I informed Dr. Smith of the discovery, he replied: "I am delighted to hear of its occurrence there, and it may be now that it will turn up in the northern or mountainous districts of New York or New England. I must say I hesitated long before I dared to identify Guenée's description as I did, with no sort of proof that the species occurred this side of the Rockies."

Mr. Brainerd intends to make a vigorous effort to discover its food plant next season, and so obtain the larva for description.

J. Alston Moffat, Curator Ent. Soc. of Ont.

DESCRIPTION OF PLATE.

The photos for the plate were taken by Mr. Dwight Brainerd, Montreal.

Figs. 1 and 2 are a natural pair of *H. rutila*.

Fig. 3 is a pupa of *H. nitela*.

Fig. 4 is a gall of same, showing the opening made by the larva.

Fig. 5, *H. Stramentosa*.

All enlarged.

CONTRIBUTIONS TO COCCIDOLOGY.—II.

BY J. D. TINSLEY, A. AND M. COLLEGE, MESILLA PARK, N. M.

During the past summer I have had the opportunity, through the kindness of Dr. Howard, of working over the unnamed material of the genera Dactylopius, Ripersia, and Phenacoccus, belonging to the collection of the Division of Entomology, U. S., D. A. I wish to record here the identity of *D. vastator*, Mask., with *D. filamentosus*, Ckll., and two species which I believe to be new. I hope in a subsequent paper to give further notes on some of the other species found, and also to record the new host plants found for a number of species.

Dactylopius filamentosus. Ckll., syn. *Dactylopius vastator*, Maskell.—I have before me a considerable quantity of material, specimens as follows: Type material of *D. filamentosus*, Ckll.; material from Island of Mauritius on Citrus sent by De Charmoy; and the following from U. S. D. A., Div. Ent.: 7232 on *Hibiscus*, Richmond, Natal; 7706 on Orange, Cape Town, Africa (Coll., Lounsbury); 5820 on Tamarind and Citrus, Honolulu, Sandwich Is. (Coll. Koebele). After carefully examining and comparing individuals from each lot of material, I can find no characteristic differences, and must therefore conclude that they are all one species. Since Cockerell described *filamentosus* in 1893 (The Entomologist, Vol. XXVI., p. 268, Sept., 1893), and Maskell described *vastator* in Trans. N. Z. Inst., 1894, p. 65, *D. vastator*, Mask., will have to stand as a synonym of *D. filamentosus*, Ckll.

The No. 5820 material is of considerable interest, it being topo-type, and is that referred to by Maskell, *loc. cit.* The most prominent characters of this species are: the habit of aggregating into masses; the abundant white or yellowish secretions; and when boiled in potash staining the liquid a dark purple to blue-green and themselves turning blue-green: they are very hard to clear; the antennæ are of 7 segments:

segment 1, 37–45 μ long; segment 2, 37–39 μ long; segment 3, 28–40 μ long; segment 4, 28–34 μ long; segment 5, 22–31 μ long; segment 6, 22–34 μ long; segment 7, 73–84 μ long; legs, femur about 140 μ long; tibia, about 100 μ long; tarsus, about 70 μ long; derm bearing peculiar spear-shaped spines. This species does not resemble *D. Townsendi*, Ckll., as supposed by Maskell. It resembles *albizziæ*, Mask., and *hymenocleæ*, Ckll., in producing the blue-green pigment in potash, but is distinct from them in the secretion and anatomical characters.

Dactylopius Texensis, n. sp.

Specimens have been in alcohol since Dec., 1895. Adult ♀; length about 3 m m.; nearly as wide as long; shape rather sub-globular; colour light brown. I know nothing at present of the secretion. Epidermis bearing scattered, medium-sized hairs and numerous small glands; margins of body with areas of glands and stout conical spines. Antennæ of eight segments: segment 1 rather large, 53–59 μ long; segment 2 rather wide, tapering slightly toward the proximal end, length 48–51 μ; segment 3 about three-fourths the width of 2, cylindrical, 52–62 μ long (the length of this segment may be either less than, equal to or greater than that of 1, they are often nearly sub-equal); segment 4 quite short, 20–28 μ long; segment 5, 28–37 μ long; segment 6, 25–31 μ long; segment 7, 31–39 μ long; segment 8 usually about 84 μ long. Among observed formulæ are: 8312 (57) (46), 83127564, 81327 (56) 4. The segments bear one or more whorls of medium-sized hairs.

Legs rather short and stout; femur about 182 μ long by 82 μ wide, bearing numerous medium-sized hairs; tibia, 132 μ long by 35 μ wide, bearing several rows of small hairs; tarsus 65 μ long; tarsal digitules long, slender, knobbed hairs; claw stout, 31 μ long; digitules of claw long, slender, knobbed. Mentum elongate. Anal lobes not conspicuous, bearing the usual long spine, and areas of cones, hairs and spinnerets. Since the specimens are alcoholic, we know nothing of the ovisac. Eggs unknown. Male unknown.

Hab.—On *Acacia Farnesiana*, Willd.; San Diego, Texas, Dec., 1895. U. S. D. A., Div. Ent., No. 6961.

Remarks.—This species resembles *D. Ryani* in antennal formula, but differs in having the antennæ smaller and the legs shorter and stouter. Resembles *D. dasylirii* in the general form of the antennæ, but differs in having segments 3 and 1 of antennæ usually longer than 2, and differs very much in the shape of the body.

Dactylopius Farnesianæ, Targ., found on *Acacia Farnesiana* at Vicenza, Italy, seems to be quite a different insect. I also have before me a Dactylopius, in alcohol, on sugar cane from Mauritius, U. S. D. A., Div. Ent., No. 6596, sent the Dept. by Miss Ormerod; these specimens I take to be the ones mentioned by Maskell in Trans. N. Z. Inst., 1896, p. 321; see also Insect Life, Vol. VII., p. 430. This *Dactylopius* differs in no material points from the *Texensis*. The general appearance of the alcoholic specimens is the same, the measurements of the segments of the antennæ come within the limits given for *Texensis*: the femur is same length as in the above; tibia is a little longer, one being 160 μ: tarsus is also a little longer, 90 μ; claw is more slender. I do not consider these differences sufficient for separating them, but it may be that when complete specimens of each are obtained there may be differences in colour, ovisac, etc., which may separate them. It seems strange that a species should be found in such widely-separated localities, and especially upon such different host plants.

Ripersia serrata, n. sp.

Adult ♀. Length, including fringe, about 2 mm.; width nearly 2 mm. Shape broadly elliptical. Colour of dried specimens blackish. There are three rows of beaded secretion on the dorsum: two lateral and a median, with the dark body showing up more or less between them, the median is most prominent. On the margin of the body is a fringe of projections; these consist of pairs of rods which become somewhat shortened and dentate toward the anterior extremity, while those of the posterior extremity of the body are longer and more distinctly rodlike: their length is usually less than half the width of the body. The general appearance of this insect, with its secretion, suggests that of *Dactylopius pseudonipæ*, and species of *Orthezia*.

Margin of epidermis bearing areas of several stout conical spines and numerous glands; numerous small glands scattered over the epidermis, and also a few scattered hairs.

Antennæ rather slender, of six segments, the relative lengths rather variable; first segment 20–25 μ long, second 22–28 μ, third 28–34 μ, fourth 17–20 μ, fifth 20–25 μ, sixth 48–56 μ. Some observed formulæ are: 632514, 632154, 63(125)4, 63(25)14, 63(12)54. The segments bear whorls of medium-sized hairs.

Legs rather slender for a *Ripersia;* femur 85–100 μ long by 35 μ wide; tibia about 70 μ long; tarsus about 45 μ long; claw rather stout;

tarsal digitules rather stout, knobbed: digitules of claw longer than the claw and knobbed. Hairs on legs rather small and scanty.

Anal lobes rather prominent, bearing a large seta 75 μ long, and a number of quite stout conical spines and spinnerets. Anal ring normal. Female ovisac unknown.

Eggs and larvæ unknown. Male unknown: male sac white, elongate, about 2 mm. long and 75 mm. wide.

Habitat.—On a creeping vine. Collected by H. Caracciolo, Port of Spain, Trinidad, W. I.; Jan. 27, 1894.

Rem.—This is No. 6160 of the U. S. D. A. collection. The most marked characteristic of this species is the peculiar arrangement of the secretion described above. It seems to resemble *R. filicicola*, Newst.

A NEW SPECIES OF SINEA.

BY A. N. CAUDELL, DEPT. OF AGRICULTURE, WASHINGTON, D. C.

Sinea complexa, n. sp.—Length, ♂, 8 to 9.5 mm., ♀, 9.5 to 11 m.m; width, ♂, 3 mm., ♀, 3.5 to 4.5 mm. General colour ranging from a very dark brown to pale cinnamon. Head armed with three pairs of anteocular spines, the posterior pair the longest, with smaller ones interspersed. Behind the eyes, with several sharp spines, one near each ocellus being almost as long as those of the posterior anteocular pair. Neck spinose. Antennæ somewhat pallid, with a slight rufous cast at the distal ends of the segments.

The anterior femora are much swollen and armed with the usual long, sharp, dorsal spine, and with ten spines beneath arranged in two longitudinal rows. The last two spines of the inner row are much larger and longer than the others, and the terminal one is out of alignment, so that it is rather on the dorso-lateral surface. (*Sanguisuga* and some other species also show this arrangement of spines on the anterior femora, but in these cases there is no striking enlargement of the spines, and hence it is not so noticeable. The nymphs of *diadema*, and probably other species as well, have dorso-lateral spines on the anterior femora.) This spine is almost as long as the dorsal one and, when the femora is viewed from the front, is quite prominent. In this view the second spine also is somewhat prominent. The anterior tibiæ have the usual double row of three strong spines below. They are pale towards the tip, with the apex black. The dorsal and two enlarged ventral spines of the anterior

femora also have the tips black. The hind and middle legs are without distinguishing characters.

Thorax with distinct, sharp spines on both lobes, those of the anterior lobe the longest. Breast spined, usually with blunt spines. Disk of the posterior thoracic lobe convex, hardly impressed longitudinally. Lateral angles quite acute, moderately prominent. Scutellum black, triangular, with raised centre and slightly turned up at the tip. Abdomen of both sexes wider than the hemelytra, considerably so in the females, where the margins are somewhat elevated and the sides rounded. Quite uniformly coloured, sometimes paler on the posterior borders of the segments near the lateral margins.

Described from specimens in the National Museum, from Los Angeles, California; collected by Mr. Coquillett. They were given the manuscript name *complexa* by Prof. Uhler. This name, with the kind consent of the author, I gladly adopt. Type No. 4433, U. S. Nat. Mus.

This species belongs to the *sanguisuga* group, characterized by a short, broad form, as opposed to the longer forms represented by *diadema*, *undulata* and *coronata*. It is quite a well-marked species, the distinctly spined posterior thoracic lobe, together with the peculiar armature of the anterior femora, readily separating it from its allies.

A NEW POPULAR NAME FOR CLISIOCAMPA DISSTRIA.

In the January number, Prof. Slingerland proposes a new common name for the "forest tent-caterpillar," and proposes "forest tentless-caterpillar." The objection would be, that "tent-caterpillar" is an English equivalent for *Clisiocampa*, and need not be altered whether the particular species makes a tent or not. What is needed in names is fixity, not relevancy. Another objection is, that *tentless* is not the antithesis to *tent*, but to *tented*. There is, on a previous page of the same number, a protest against changes in Latin terms in entomology, and also systems of classification. Whatever force lies in this protest is doubled when English names, which have no classificatory significance, are to be considered. I should therefore be in favour of retaining the names, "apple tent-caterpillar" and "forest tent-caterpillar," for the two species of *Clisiocampa*, now known under these common titles. If inapplicability were a valid reason for changing names in entomology, we should be quite lost. And the new name, "forest tentless-caterpillar," besides implying that the insect is not a *Clisiocampa*, ceases to be distinctive, for there are other caterpillars of the forest which are unprovided with tents.

A. Radcliffe Grote, Hildesheim, Germany.

NYMPHS OF NORTHERN ODONATA, STILL UNKNOWN.

BY JAMES G. NEEDHAM, LAKE FOREST, ILL.

This is a word in season to collectors of aquatic insects, who may be afield during the months of spring and early summer.

Among the nymphs of Odonata occurring in the North-eastern States and Canada, there remain a number of good discoveries to be made. In any locality where these nymphs are common their discovery will not be a difficult matter. Nymphs of the following half-dozen species are pre eminently desirable :

1. *Tachopteryx Thoreyi*, Sel. Atlantic States. No nymphs of its subfamily known.
2. *Gomphæschna furcillata*, Say. Eastern States.
3. *Nannothemis bella*, Uhl. Atlantic Seaboard.
4. *Neurocordulia obsoleta*, Say. Eastern States.
5. ? *Neurocordulia Uhleri*, Sel. Me. Mass., N. J.

No nymphs of these genera known.

6. *Somatochlora Lintneri*, Hag. N. Y., Saskatchewan.

The last-named genus, which is peculiarly a northern one in our fauna, is large and polymorphic. Even the imagoes are very insufficiently known, and few nymphs of fewer species have been taken, though they must be very common in proper localities. Canadian collectors have every advantage in the study of this genus.

While a large number of nymphs of Odonata have been collected and reared of late, descriptions of them have not, unfortunately, as yet got into print. The species above mentioned are among the most desirable of those which have not, I believe, as yet been found. I have had no difficulty in rearing all the genera and almost all the species occurring in the localities in which I have lived during the last five years : but these six have not come my way. I should be glad to help any one who wishes to undertake to find and rear these nymphs, by sending a printed account of the methods I have used successfully, and by the determination of dragon fly material in all stages of development.

A STUDY OF HYDROMETRA LINEATA.

BY J. O. MARTIN, CORNELL UNIVERSITY, ITHACA, N. Y.

Among the reeds and rushes that border quiet streams and ponds lives *Hydrometra lineata*, one of the least known of our North American Hemiptera. This insect is comparatively rare in collections, but common enough in nature, though owing to its small size and inconspicuous appearance it escapes all but the sharpest-eyed collectors. Its elongate body is borne on hairlike legs and resembles a bit of twig or grass more than a living insect. After the eye becomes accustomed to the odd shape, they are most easily distinguished, especially when they move about over the surface of the water. During the past summer I took over five hundred specimens of this insect without any special effort, finding them common through New York State, Massachusetts, and Connecticut.

The appearance of this insect is unique and exceedingly grotesque, for the head, thorax and abdomen are so elongate and the legs so thin that it produces the effect of a minute Indian club stalking about on the water. Closer examination reveals a pair of solemn, protruding eyes situated at about the middle and on either side of the handle of this Indian club, while from the end a pair of threadlike antennæ are waved about in a mysteriously cautious manner. Underneath the head is the murderous beak, the common possession of all hemipterous insects. In very rare cases individuals may be found with a pair of wings closely folded upon the back and covered with leathery hemelytra, which are only to be detected by the use of a lens.

The economy of this elongate form becomes at once apparent on studying the habits of Hydrometra. In the first place, it reduces the insect's weight to the minimum and lessens the liability of breaking through the treacherous surface film upon which the life of this aquatic pedestrian is passed. In the second place, the long, cylindrical body is so like a bit of twig in appearance that Hydrometra is protected from his enemies and concealed from his prey, which do not in the least suspect in this apparent straw the presence of a deadly foe.

The genus Hydrometra was first established by Latreille in his "Precis des Caractères Generiques des Insects" (1797) p. 86. I have not had access to this book, but in his "Histoire Naturelle des Crustaces et Insects," T. xi., pp. 267-269 (1804), Latreille says: "I have taken the characters of the insect pointed out by Geoffery, *Cimex stagnorum*

(Linn.). . . . . My genus Hydrometra is easily distinguishable from Gerris in the following characters: Head drawn out into a long, cylindrical snout, recurvant and in a longitudinal groove the beak. These insects have the body very narrow, slender and linear, the head very long and slender, carrying at the extremity of the elongate snout two setaceous four-jointed antennæ. The eyes are large and globular and are situated near the middle of the snout; Linnaeus mistook them for tubercules. The thorax is long and cylindrical, the tegmina are very short and narrow and lie on the back, not occupying more than the interval between the second and third pairs of legs. The abdomen is very long and slightly larger than the anterior portion of the body; it is cylindrical and has two longitudinal keels, one on each side of the border. The legs are very thin and long, the middle pair being nearer the anterior pair than to the posterior. Hydrometra loves aquatic places, and runs with some agility on the surface of the water, but not very rapidly. It is this habit that gives them their name Hydrometra (water measurer)." When Latreille first established this genus it contained but two species, one from Europe, *H. stagnorum*, and another from the West Indies, the first serving as the type.

Cimex stagnorum (Linn.), Latreille's type, was placed by Linnaeus, who described it, in his heterogeneous genus Cimex, which included many widely different Hemiptera. Later naturalists in dividing up this genus placed *H. stagnorum* in various genera, such as Gerris and Emesa, until it was rescued by Latreille and placed in a genus by itself, which its unique characters well merited. Later, Burmeister,* setting aside Latreille's work, proposed the generic name Limnobates for this insect, and this name is frequently to be met with in comparatively recent books.

The United States, like Europe, has up to the present but a single species, and this (*H. lineata*) was first described by Thomas Say.† I quote the following: "H. lineata. Fuscous; hemelytra dull whitish with black nervures. Inhabits United States. Body fuscous or brown, more or less deep; hemelytra dull whitish or dusky, with black nervures; tergum pale, quadrilineate with black; two of the lines on the edge and the interval between the two inner lines, dull whitish or bright yellow; the incisures of the segments more or less black; beneath and feet obscure

* "Handbuch der Entomologie" (1839), Vol. II., No. 1, p. 210.

† The complete writings of Thomas Say on the Entomology of North America (Leconte's Edition), Vol. I., p. 361.

yellowish : thorax with a more or less obvious pale line. Length, seven-twentieths of an inch. This is very much like the *stagnorum*, F., but the hemelytra are not testaceous and there is no thoracic impressed line.

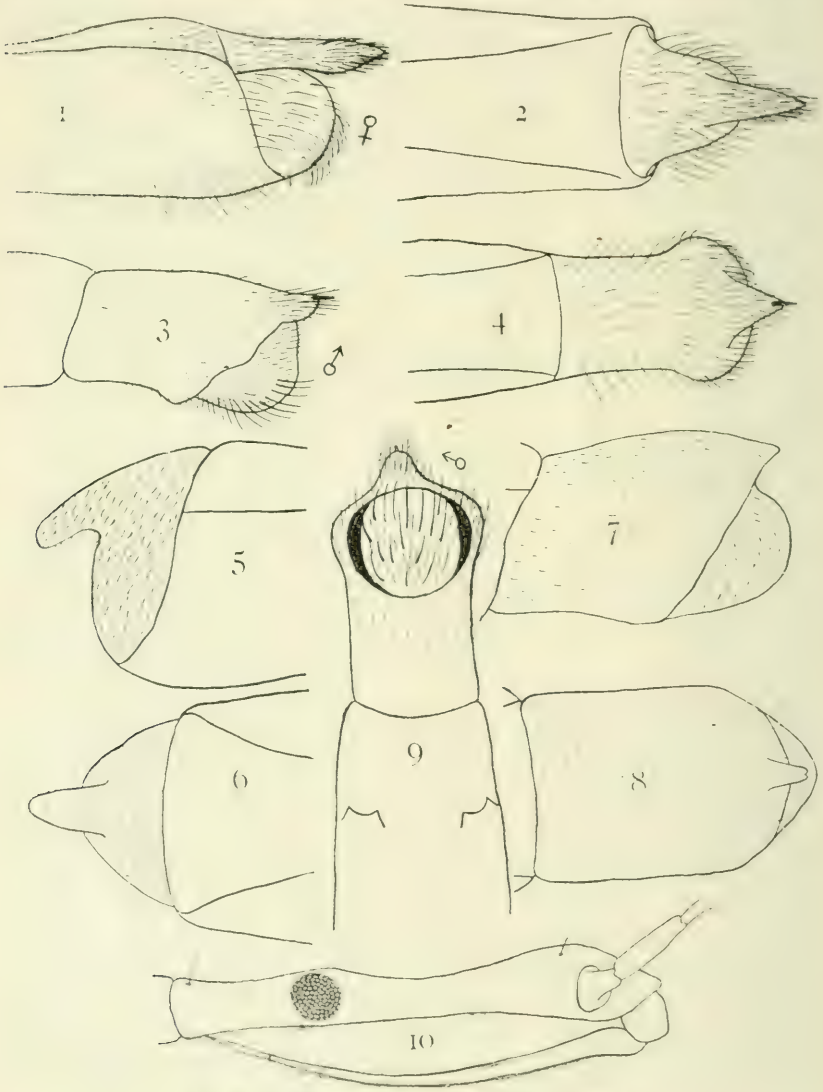

PLATE III.—Structural details of *Hydrometra lineata*.

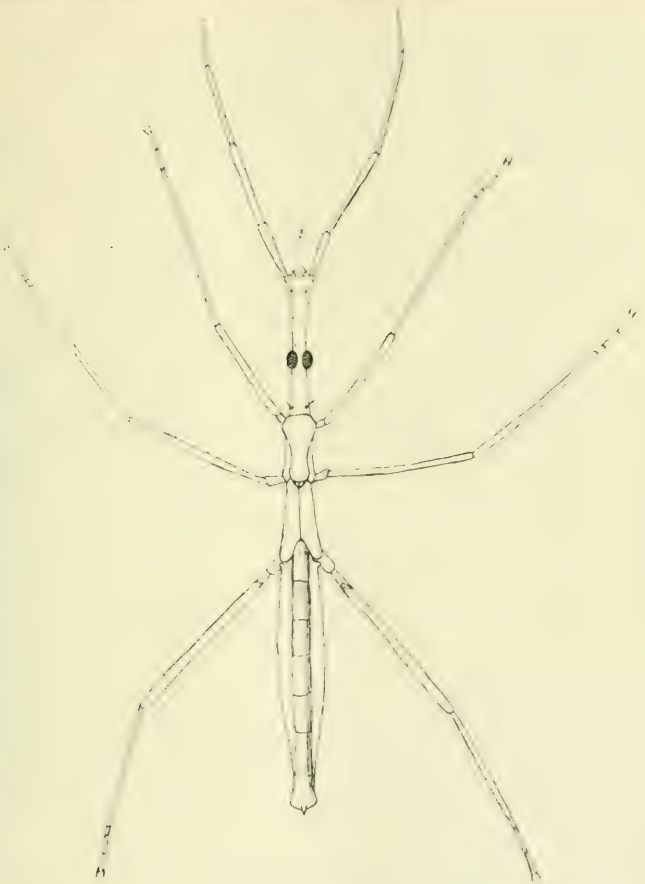

Fig. 7.—*Hydrometra lineata*. Male.

EXPLANATION OF PLATE III.

Fig. 1.—Lateral view of genitalia of *H. lineata*, female.
" 2.—Dorsal " " " " female.
" 3.—Lateral " " " " male.
" 4.—Dorsal " " " " male.
" 9.—Ventral " " " " male.
" 5.—Lateral " " *H. stagnorum*, female.
" 6.—Dorsal " " " " female.
" 7.—Lateral " " " " male.
" 8.—Dorsal " " " " male.
" 10.—Lateral view of head of *H. lineata*.

[Male?] Body blue-black; thorax with a pale line; antennæ and feet dark honey yellow; tergum and venter without lines."

"Var. a. *Australis*. Head beyond the eyes a little longer and a little more dilated at tip; second joint of the antennæ a little more dilated at tip; abdomen with five lateral whitish points. Inhabits New Orleans."

It will be noted in the above description that Say could find no very specific difference between *H. lineata* and *H. stagnorum*: by looking carefully at the genitalia of each, however, it is seen that there is a wide difference between them. It is in these fundamental structures that we find the variations which are best adapted for separating the species referred to in the above. Just what these differences are may best be seen by reference to Plate III., where Figs. 1 and 2 show lateral and dorsal views of the genitalia of the female *H. lineata*, and Figs. 3 and 4 show lateral and dorsal views of the male genitalia of the same species; Figs. 5 and 6 are the genitalia lateral and dorsal of female *H. stagnorum*; Figs. 7 and 8 are the same for the male of this latter species. The male is darker in colour than the female, and much smaller, the average length of twenty males being 8.8 mm., while twenty females averaged 9.7 mm. in length.

The peculiar habitat of Hydrometra, combined with its elongate form, has given rise to a secondary sexual character, which occurs in both *H. lineata* and *H. stagnorum*. This consists of two notched projections on the inner side of the sixth abdominal segment, close to the incisure between the sixth and seventh segments. The object of these notched elevations of the abdominal walls is to fit over the lateral keels of the female abdomen, thus steadying the abdomen of the male during copulation. This is rendered necessary not only by the elongate abdomen, but also by the fact that it is necessary for the insects to maintain their balance upon the water or run the risk of breaking through the treacherous surface film, an accident very likely to cause death. The abdomen in both sexes is stiffened and made rigid by a concentration of the segments along the venter, and by two keel-like lateral expansions of the abdominal segments. Along these keels the segments have become so firmly cemented that the joints between the segments do not show, thus giving to the keels the appearance of continuous structure.

The life-history of *H. lineata* is similar to that of other Hemiptera in that there are several broods during the summer. The insect hibernates in the adult stage, and during the first warm days of spring crawls stiffly out from under the rubbish along the banks, where it has passed the winter. When the weather becomes warm enough (the first to tenth of May at Ithaca), egg-laying begins; the female becomes restless and stalks about in search of a place to deposit an egg. The laying of an egg by this stiff-abdomened, clumsy creature is accomplished in a very peculiar manner: Backing up to a grass stem or almost any firm object which

rises above the water, she exudes from the genital opening a drop of a gummy gelatinous substance, which she then presses against the object that has been chosen to support the egg. This sticky mass is the base of the egg-stalk, and hardening very soon, fastens the egg in place before it has left the body. The insect now walks away from the stalk, thus freeing herself from the egg. This egg, as may be seen from the drawing (Fig. 8), is long and spindle-shaped, with the micropile on the extreme end away from the point of attachment. The length of the egg is about two millimetres, a little more than one-fifth the total length of the insect apart from the antennæ, and about one-half the length of the abdomen. I was unable to determine how many eggs each female lays, for Hydrometra is not an easy insect to raise in confinement, being easily drowned in aquaria, and then the eggs are very hard to find where there is anything like an approach to natural conditions. The number cannot be very great, however, for the size of the egg is such that the abdomen could hardly contain more than four or five at the most. Each egg is attached to its support at right angles to the surface, but is frequently found hanging down as the result of some accident.

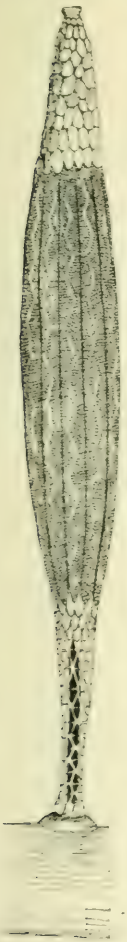

Fig. 8.—Egg of Hydrometra.

The interior egg sac is protected by a horny exterior coating decorated with longitudinal ribs or flutings, the surfaces of which are granulated and marked by a rather indistinct hexagonal pattern; in the drawing this pattern has been exaggerated in order to call attention to its existence, for it is not at first apparent, and indeed does not appear to be present in some cases. Around the micropile end this protective coating takes the form of a series of plates, while around the stalk it extends in an enclosing sheath of a delicate tracery of network, through which can be seen the darker coloured supporting stalk. Mounted in Canada balsam this covering becomes more or less transparent, showing the oval pod-shape of the egg proper, with its slender stalk on one end and the micropile on the other.

Out of this egg there emerges, seventeen days after laying, the soft-bodied, light green nymph which has, as do all Hemiptera, the general characters of the adult. The nymph in this case

differs, however, from the adult in having the tarsi one-, instead of three-jointed. The body is so soft at birth and during the five moults which follow that the nymphs are frequently drowned, not being able to raise their bodies above the surface film so easily as do the more rigid adults.

During the summer there are varying numbers of broods, depending largely upon the length and temperature of the season, for this simple life-history is repeated as fast as the insects reach maturity.

Hydrometra is a carnivorous insect, its food consisting of the juices of insects that fall into the water, and the number of these is considerable along the grassy aquatic borders. When such a hapless insect falls into the water it is at once pounced upon by one or several voracious Hydrometras, who insert their beaks and proceed to suck the juices from their still struggling victim. I have seen no less than ten thus surround their prey, all with their heads in the direction of common interest and their bodies radiating outward. The body and legs of Hydrometra are covered with minute hairs, which prevent the body from being easily wet. The insect is constantly engaged in lifting its legs into the air to dry them, for if they once become wet they sink through the surface film just as would a floating needle. When Hydrometra does break through the surface film he is often able to free one leg after another, and then by main force raise his body up also.

In Lethierry and Severin's Catalogue of the Hemiptera there are listed eleven species of Hydrometra, but this list is not complete, for it does not contain *H. lineata*. These eleven species are mostly tropical and sub-tropical, with the exception of the European species and one from Siberia. One species from the Philippines may eventually become a member of the fauna of the United States, though at present *H. lineata* is our sole representative of this genus. It seems that subsequent study will show more species within the boundaries of the United States, and that Say's variety *australis* will be found to be a distinct species.

ORCHELIMUM, SERV.

BY JEROME M'NEILL, STANFORD UNIVERSITY, CALIFORNIA.

This genus of Orthoptera is confined almost entirely to North America, where it is represented by twenty or more species. Joseph Redtenbocher in his "Monographie der Conocephaliden," published in 1891, united *Orchelimum*, Serv., to *Xiphidium*, Serv. This action seems scarcely justified, as the two groups are quite as distinct as many other Orthopteran genera, and Redtenbocher's authority has not been generally recognized in this country. The species are distinguished with difficulty and the descriptions are widely scattered. These considerations have led me to attempt to make a key for their identification. It is quite possible that some of the species indicated are synonymous, but I am inclined to believe that all I have recognized are good, and I believe there are a considerable number undescribed. Many forms which differ from each other by very few structural differences are distinguished by some peculiarity of song or habit or habitat, and it is certain that a considerable number of them have been overlooked.

Key to Orchelimum.

A. Hind femora not armed with small spines on the under side.

b¹. Ovipositor straight or very slightly curved; face not striped medianly, pale.

c¹. Tegmina surpassing the tips of the femora more or less. Length of the ovipositor 10 mm. or more, little if any less than two-thirds the length of the hind femora.

d¹. Pronotum short, less than one-fourth the length of the body and not more than 4 mm. long; tegmina only slightly surpassing the tips of the hind femora; a broad reddish-brown band upon the head and pronotum, somewhat paler in the middle..... *Delicatum*, Bruner.

d². Pronotum longer, more than one-fourth the length of the body and more than 4 mm. long; tegmina little if any shorter than the wings and reaching almost to the tip of the ovipositor; two well-defined narrow dark brown diverging lines upon the pronotum..... *Gladiator*, Bruner.

c². Tegmina not reaching the tips of the hind femora; ovipositor brown, much less than 10 mm. long..... *Minor*, Bruner.

b². Ovipositor decidedly curved.

c¹. Size small, less than 14 mm.; tegmina without the two black lines usually present on either side of the speculum..... *Gracile*, Harr.

c². Size medium or large, at least 16 mm. long.

d¹. Face pale or unicolorous, never with reddish-brown or fuscous stripe down the middle.

e¹. Hind femora short, less than five-sixths the length of the body and not exceeding 15 mm. in length.

f¹. Tegmina not much exceeding the hind femora; ovipositor less than 9 mm. long; posterior margin of the lateral lobes strongly sinuate; anterior and middle tibiæ green or yellowish..... *Vulgare*, Harr.

f². Tegmina far surpassing the tips of the hind femora; ovipositor more than 10 mm. long; posterior margin of the lateral lobes of the pronotum distinctly but not strongly sinuate; anterior and middle tibiæ fuscous black..... *Robustum*, Red.

e². Hind femora longer, at least five-sixths as long as the body and not less than 17 mm. in length; ovipositor less than half as long as the hind femora.

f¹. Pronotum longer, more than one-fourth as long as the body; tegmina not far surpassing the tip of the hind femora.

g¹. Tegmina not narrowed in the middle; anal cerci of the male slender, the basal tooth short and weak; tegmina and wings olivaceous brown; size less than medium..... *Campestre*, Blatchley.

g². Tegmina narrowed in the middle; anal cerci of the male swollen, armed within with a strong basal tooth; posterior margin of the lateral lobes of the pronotum strongly sinuate; size greater than medium..... *Glaberrimum*, Burm.

f^2. Pronotum short, less than one-fourth as long as the body; tegmina far surpassing the tip of the hind femora and distinctly shorter than the wings.....*Longipenne*, Scudd.

d^2. Face with a reddish-brown stripe down the middle; pronotum short, less than one-fourth the length of the body; ovipositor less than one-half the length of the hind femora; body slender.

e^1. Stripe broadly expanded on the lower half of the face, forming a triangular spot; tegmina brownish-green or testaceous.....*Concinnum*, Scudd.

e^2. Stripe not expanding on the lower part of the face; tegmina and wings transparent whitish tinged with green on the principal veins of the lateral field.....*Indianense*, Blatchley

A^2. Hind femora armed with one or more small spines on the under side.

a^1. Tegmina not much longer than the body, generally plainly shorter; ovipositor decidedly curved and never more than 9 mm. long.

b^1. Face pale, without a narrow median stripe.

c^1. Tips of the hind femora surpassed by the tegmina.

d^1. Dorsal stripe present; ovipositor exceeding half the length of the hind femora; pronotum more than one-fourth the length of the body.....*Sylvaticum*, McNeill.

d^2. Dorsal stripe absent; ovipositor less than half the length of the hind femora; pronotum less than one-fourth the length of the body.....*Spinulosum*, Red.

c^2. Tips of the hind femora not reached by the tegmina, which are decidedly shorter than the body; pronotum considerably more than one-fourth the length of the body.....*Cuticulare*, Serv.

b^2. Face with a narrow median stripe .....*Agile*, DeGeer.

a^2. Tegmina considerably longer than the body.

b^1. Ovipositor not more than 9 mm. long and decidedly curved.

c^1. All the tibiæ black or infuscated on the upper side; ovipositor plainly more than half the hind femora;

pronotum not less than one-fourth the length of the body; dorsal stripe present, though frequently obsolete posteriorly. . . . . *Nigripes*, Scudd.

c^2. All the tibiæ not black nor infuscated on the upper side; ovipositor distinctly less than half the length of the hind femora; pronotum less than one-fourth the length of the body; dorsal stripe wanting. . . . . *Nitidum*, Red.

b^2. Ovipositor at least 10 mm. long.

c^1. Hind femora spined only on the outer carina of the under side; ovipositor nearly straight.

d^1. Tegmina not more than 25 mm. even in the female, much less in the male; general colour brownish-green; dorsal stripe bordered by two narrow lines of darker brown. . *Bruneri*, Blatchley.

d^2. Tegmina not less than 25 mm. long even in the male, much more in the female; tegmina strongly reticulate; the anal area forming a distinct angle with the lateral field. . . . . *Volantum*, McNeill.

c^2. Hind femora spined on both carinæ of the under side; ovipositor distinctly curved; dorsum of the pronotum with two reddish-purple stripes; pronotum less than one-fourth the length of the body. . . . *Laticauda*, Red.

ORCHELIMUM DELICATUM, Bruner.

Orchelimum delicatum, Bruner. Ent. News, III., 264, Dec., 1892.
" *gracile*, Bruner. CAN. ENT., XXIII., 70.
Not " " Harr.

This species was re-named by Bruner when he found it necessary to restore Harris's *O. gracile*, which on the authority of Scudder had been considered a synonym of *Xiphidium fasciatum*, De Geer.

It is very limited in distribution, being known only from Nebraska, where, however, Bruner says it is "quite common in the vicinity of West Point, about the margins of ponds, etc." He also took it at the electric light in Lincoln.

ORCHELIMUM GLADIATOR, Bruner.

Orchelimum gladiator, Brun., CAN. ENT., XXIII., 71.
" " Blatchley, Proc. Ind. Acad. Sci., 1893.*

Nebraska, "On the flowers of a prairie golden-rod (*Solidago rigida*, L.), at West Point," Bruner; Indiana, "From the borders of a tamarack swamp," Blatchley.

ORCHELIMUM MINOR, Bruner.

Orchelimum minor, Bruner, CAN. ENT., XXIII., 72, Apr., 1891.

Apparently a rare species, known only from the District of Columbia. It is unknown to me and has not been recognized since it was named.

ORCHELIMUM VULGARE, Harr.

Orchelimum vulgare, Harr., Ins. Inj. to Veg., p. 162, fig. 77, 1862.
" " Scudd., Mat. for Mon., 452, 1862.
Xiphidium agile, Red., Mon. der Con., 186, fig. 80, 1891.

It is very probable that many of the references to this insect are mistaken. It seems to range over the northern United States from the Pacific to the Atlantic, and northward for an unknown distance into British America. It is found as far south as Arkansas and Maryland.

ORCHELIMUM GRACILE, Harr.

Orchelimum gracile, Harr., Ins. Inj. to Veg., 1862, p. 163, fig. 78.
" " Brun., Ent. News, III., Dec. 1892, 264.

Not *Xiphidium fasciatum*, Scudd., Mat. for a Mon., 1862, 451.

According to Bruner, Scudder was mistaken in referring *O. gracile* to X *fasciatum*. Massachusetts, Harris; New Jersey, Bruner.

ORCHELIMUM ROBUSTUM, Red.

Xiphidium robustum, Red., Mon. Con., 185, 1891 New Orleans, Redtenbocher.

ORCHELIMUM CAMPESTRE, Blatchley.

Orchelimum campestre, Blatch., Proc. Ind. Acad. Sci., 133, 1893.

Reported from Vigo and Fulton Counties, "In upland prairie meadows, where it frequents the tall grasses, usually in company with *Xiphidium strictum*, Scudd."

ORCHELIMUM GLABERRIMUM, Burm.

Xiphidium glaberrimum, Burm., Hand., II., 3, 707, 1839.

*The title page of the author's reprint bears the date 1892, but it is evident that this paper was not printed until 1893 or later, as some of the synonymy given bears the date 1893. (See page 135.)

Orchelimum glaberrimum, Scudd., Mater. for a Mon., 453, 1862.
Xiphidium " Red., Mon. der Con., 187, 1891.

The whole United States east of the Rocky Mountains.

ORCHELIMUM LONGIPENNE, Scudd.

Orchelimum longipenne, Scudd., Mat. for a Mon., 453, 1862.
Xiphidium inerme, Red., Mon. der Con., 187, 1891.

Texas, Redtenbocher, Scudder; Kansas, Nebraska, Bruner.

ORCHELIMUM CONCINNUM, Scudd.

Orchelimum concinnum, Scudd., Mat. for a Mon., 452, 1862.
? " *herbaceum*, Serv., Hist. Nat. Orth., 524, 1839.
Xiphidium concinnum, Red., Mon. der Con., 188, 1891.

Blatchley says: "It frequents the weedy and grassy margins of marshes and lowland ponds and reaches maturity about August 15th." Massachusetts, Scudder, Redtenbocher; New York, Beutenmüller; Indiana, Blatchley; Illinois, McNeill; Nebraska, Bruner.

ORCHELIMUM INDIANENSE, Blatch.

Orchelimum Indianense, Blatch., Proc. Ind. Acad. Sci., 137, 1893.

Blatchey says it was "quite common among the rank grasses and sedges about the margins of a tamarack swamp near Kewana, Fulton County, Indiana.

ORCHELIMUM SYLVATICUM, McNeill.

Orchelimum sylvaticum, McNeill, Psyche, 26 Feb., 1891.
" " Blatch., Proc. Ind. Acad. Sci., 136, 1893.

Found on corn and about open places in the woods. Blatchley says: "It frequents the borders of cultivated fields and open woods." Illinois, McNeill; Indiana, Blatchley.

ORCHELIMUM SPINULORUM, Red.

Xiphidium spinulorum, Red., Mon. der Con., 189, 1891. North Carolina, Redtenbocher.

ORCHELIMUM CUTICULARE, Serv.

Orchelimum cuticulare, Serv., Hist. Nat. Orthop., 523, 1839.
Xiphidium cuticulare, Red., Mon. der Con., 189, 1891. Texas, Redtenbocher.

ORCHELIMUM AGILE, De Geer.

Locusta agilis, De Geer., Mem., III., 457. Pl. 40, Fig. 3, 1778.
Orchelimum agile, Scudd., Mat. for a Mon., 453, 1862.
Not *Xiphidium agile*, Red., Mon. der Con., 186, 1891.

There is considerable uncertainty concerning the status of this species. Redtenbocher made *O. vulgare*, Harr., a synonym, but Blatchley points out that Redtenbocher's measurements do not agree with those of *vulgare*. The species as determined by Scudder, as it is represented in my collection, has the under sides of the hind femora spined. Maryland, Illinois, Scudder; Kansas, Nebraska, Bruner; Montreal, Canada, Caulfield; New Jersey, Smith; New York, Beutenmüller.

ORCHELIMUM NIGRIPES, Scudd.

Orchelimum nigripes, Scudd., Ent. Notes, IV., 62, 1875.

Xiphidium nigripes, Red., Mon. der Con., 188, 1891.

The range of this species seems to be from the Rocky Mountains to Indiana, and Texas to Nebraska. It has not been reported east and south of the Mississippi and Ohio.

ORCHELIMUM NITIDUM, Red.

Xiphidium nitidum, Red., Mon. der Con., 189, 1891.

Georgia, Redtenbocher.

ORCHELIMUM BRUNERI, Blatch.

Orchelimum Bruneri, Blatch., Proc. Ind. Acad. Sci., 139, 1893.

This species is apparently closely related to my *O. volantum*, and it may prove identical. Said by Blatchley to be "common on the leaves and stems of a tall, broad-leaved knot-weed (*Polygonum amphibium*), which grows luxuriantly in the shallow waters about the margins of two or three large ponds in the Wabash River bottoms." The same authority reports it from the margin of Lost Lake, Marshall Co., Ind.

ORCHELIMUM VOLANTUM, McNeill.

Orchelimum volantum, McNeill, Psyche, VI., 26, Feb., 1891.

Found only on *Sagittaria variabilis*, in a single locality on the banks of Rock River, Illinois, near Cleveland, Henry County. It makes more use of its remarkably long wings than any other species of the genus known to me.

ORCHELIMUM LATICAUDA, Red.

Xiphidium laticauda, Red., Mon. der Con., 190, 1891.

New Orleans, Redtenbocher.

NOTES ON SOME NORTH AMERICAN YPONOMEUTIDÆ.

BY HARRISON G. DYAR, WASHINGTON, D. C.

(Continued from page 41.)

Genus GLYPHIPTERYX, Hübn.

Hübn., Verz. Bek. Schmett., 421, 1816; Wals., Proc. Zool. Soc., Lond., 1897, 118.

Synopsis of Species.

Hind wings narrowly oblong, the fringe about as long as the width of the wing.

A series of black and silver dots along the margin of wing at anal angle.

Fore wing with a straight white line across the middle.

A purplish space subterminally, with three white dashes on costa ..... *bifasciata*, Wals.

No purplish space, but a nearly continuous white line beyond the middle line..... *unifasciata*, Wals.

Fore wing with a white costal bar at middle, preceded and followed by white lines that converge toward inner margin..... *quinqueferella*, Wals.

Fore wing without such spots on the margin.

A curved white streak on middle of inner margin ..... *impigritella*, Clem. (= *exoptatella*, Chamb.)

This white streak not curved.

This white streak a triangle without a costal dot opposite it..... *circumscripta*, Chamb.

This streak with an opposed white costal streak..... *Californiæ*, Wals.

Hind wings broader, the fringe much shorter than the width of the wing.

Fore wing with no costal white streak except at the apex, the other lines being lead colour..... *regalis*, Wals.

Fore wing with white costal streaks.

No conspicuous white streak on middle of inner margin..... *quadragintapunctata*, Dyar.

A white streak on the middle of inner margin.. *montiselia*, Chamb.

G. quadragintapunctata, n. sp.

Fore wings dark brown, the apex golden; seven yellowish white dots on the costa, the third from the base continued as a white line across the

wing to the inner margin, the fourth an oblique dash crossing the wing about one-third its width; 5th at the end of a curved opalescent line that runs across the wing to tornus; 7th produced as a short opalescent line; 8th as a longer opalescent line that ends on middle of outer margin; disk broadly blackish, thickly filled in with little yellow dots that appear opalescent in certain lights. Hind wings blackish brown, the fringe paler; abdomen white ringed, especially below; legs black spotted outwardly. One female, expanse 14 mm. Onaga, Kansas (F. F. Crevecœur). U. S. Nat. Mus. Type No. 4424.

Genus CHOREUTIS, Hübn.

Hübn., Verz. Bek. Schmett., 373, 1816.

Spnopsis of Species.

Fore wing ochreous at tip ..... *inflatella*, Clem.
Fore wing not ochreous at tip.
Fore wing broadly ochreous at base..... *silphiella*, Grote.
Fore wing slightly ochreous at base in streaks or not at all so.
Extreme base of wing dark.
Dark basal space contracted, the middle of the wing filled in by a purplish cloud containing black specks.
This cloud edged by a distinct white line ..... *onustana*, Walk.
Edges of this cloud only a lighter shade of purplish.
Outer edge of cloud irregular, dentate; two ochreous streaks at base.. *bjerkandella*, Thunb.
Outer edge of cloud defined by a curved line; no ochreous at base ..... *sororculella*, Dyar.
Dark basal space not contracted, occupying half the wing, the pale cloud occupying the terminal half with the black specks segregated into a patch below vein 5.
Basal space crossed by a white line.
This line curved ..... *occidentella*, Dyar.
This line straight. ..... *extrincicella*, Dyar.
Basal space without a traversing line..... *Coloradella*, Fern. MS.
Extreme base of wing whitish gray ..... *leucobasis*, Fern. MS.

C. inflatella, Clem., Proc. Ent. Soc. Phil., II., 5, 1863; *virginiella*, Clem., Proc. Ent. Soc. Phil., III., 505, 1864.

I cannot distinguish Clemens's two species, described as Brenthia.

C. sororculella, n. sp.

Generally similar to *bjerkandella*, Thunb., but without any traces of the yellow dashes at the base of fore wings. The pale gray space in the middle of the wing is sharply limited without and within by a paler line; in the centre of this space is a large group of black and metallic scales; beyond the pale line are no black scales, but a regular, distinct, subterminal metallic line; a subcostal metallic streak in basal space. Hind wings with a white dash as in *onustana*. Two examples. Placer Co., California. June (A. Koebele); U. S. Nat. Mus., type No. 4426.

C. occidentella, n. sp.

Grayish brown; basal half of wing of this colour, with a curved white line across its centre. Terminal half of wing filled, except somewhat narrowly along outer margin, by a large whitish patch, irrorate with brown scales, containing above a small black patch and below a large quadrate one, cut by a whitish line transversely; silvery scales along costa basally, middle of wing, subterminally and in the black patch. Hind wings brown, immaculate. Below a faint, irregular, whitish, submarginal line on hind wings and two costal dots on fore wings. Expanse 14 mm. One male. California (coll. Beutenmüller). U. S. Nat. Mus., type No. 4428.

C. extrincicella, n. sp.

Light brown, head and palpi whitish. Fore wing with basal half brown, crossed by a broad, straight, white line with a few silvery scales outwardly on costa. Terminal half of the wing nearly white except narrowly along outer margin, streaked above with longitudinal, somewhat cuneate, lines of black scales, below containing a single elongate, rounded, black patch with two groups of silvery scales; similar scales on outer border of white patch; outer half of fringe white. Hind wings pale brown. Expanse 12 mm. One male. Wisconsin. U. S. Nat. Mus., type No. 4427.

Genus Thelethia, Dyar.

Dyar, Can. Ent., XXV., 301, 1893; *Thia*, Hy. Edw. (preoc. Col. 1840); Hy. Edw., Ent. Am., III., 181, 1888; Kirby, Cat. Lep. Het., I., 901, 1892.

T. extranea, Hy. Edw., Ent. Amer., III., 181, 1888; Smith, List. Lep. Bor. Am., No. 956, 1891; Dyar, Can. Ent., XXV., 301, 1893.

I include this genus here tentatively. I have not seen a specimen in six years, and my old notes give only the venation. It may be a Tineid near Incurvaria.

FURTHER OBSERVATIONS UPON BOMBYX CUNEA, DRURY, ETC.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

To make my way clear I beg to state the objects I had in view in writing the article that appeared under my name in the number of the CANADIAN ENTOMOLOGIST for last May. They were these :

I.—To establish the identity of the *Spilosoma Antigone* of Strecker with the *Spilosoma congrua* of Walker.

II.—To show that Dr. Riley's series of wings in Fig. 87, *Packard's Forest Insects*, does not afford a proof conclusive that *cunea*, *textor*, *punctata* and *punctatissima* are one and the same species of insect.

III.—To bring into notice a Spilosoma which answers to the figure given by Drury of his *Bombyx cunea.*

I.—It is admitted that *Antigone* and *congrua* are identical. I need not say anything more on that point.

II.—I have always looked upon Riley's series of wing-figures with distrust—much as I should regard a catena brought forward by a controvertialist to support an erroneous opinion ; and, in the paper I have mentioned, I endeavoured to show the weakness of his position by stating that a like series of wing-figures could be taken from specimens of moths raised from "black ground-feeding larvæ." It has been said "*there is no doubt at all of the identity of all these forms*," and if a positive assertion could have settled the matter, it would have been settled ; but a chain is not stronger than its weakest links, and Sir James Smith *was not sure* of the identity of *punctatissima* with Drury's *congrua*, and Dr. Ottolengui gives voice to a doubt, which others beside himself have felt, and says : "Is it possible that the immaculate and the spotted forms of *cunea* may be distinct?" (By these "forms" I understand him to mean *punctatissima* and *textor.*)

Smith and Abbot give us a picture of their *Phalæna punctatissima.* There is an irregularly spotted male insect, a spotless female, and a larva feeding upon a sprig of mulberry. Quite a fancy sketch ! And this is the description appended :

"Ph. Bombyx elinguis, alis deflexis corporeque niveis nigro punctatis, thorace utrinque lunula nigra."

And under this is a note (the italics are mine) :

"*Whether this be the cunea of Mr. Drury or not*, it deserves a more expressive, or rather a less erroneous, name. *The character above given applies to the male only, the female being entirely white.*"

Now, Dr. Dyar tells us that "Walker knew *cunea*, Drury" (CAN. ENT., v. XXXI., p. 155), very well. What does Walker say about the female of the species? This is what he says: "*Female*—Hind wings with *some brown submarginal spots.*"

There is no warrant whatever for speaking of an *immaculate cunea, Drury*—whether male or female. Drury neither figured nor described such an insect.

I hope it will be understood that when I have spoken of *cunea* I have meant *Drury's* cunea—not the insects that of late have been erroneously called by that name. When I have spoken of moths from fall webworms, I have designated them as such, or I have used the term given by Harris for the northern immaculate insect, and the term given by Smith and Abbot for the southern spotted insect.

Hyphantria textor, Harris, and *Phalena punctatissima*, S. and A., are supposed to be (though Harris had no idea that they were) seasonal varieties of one and the same species of moth—a moth that comes from the fall webworm.

In Canada we have only one brood of this species in the year, but southward there are two generations of it. Thus Dr. Wm. Saunders writes:

"In the northern United States and Canada there is only one brood of this insect in the season, but in the south it is frequently double-brooded, the first brood of the larvæ appearing in June, the second in August."—*Insects Injurious to Fruits*, p. 73.

And Dr. L. O. Howard writes:

"In the District of Columbia and north to New York City there are two generations annually." * * * * * * *

"The caterpillars of the second generation begin to make their appearance in force in August."—*Farmers' Bulletin No. 99*, p. 20.

It is, I presume, the moths from this *second* generation that Dr. Ottolengui refers to in his "Contribution, etc.," in the December number of the CANADIAN ENTOMOLOGIST, pp. 358–9.

With his remarks, as to the profuse spottedness of these early moths, agree, in part, the words of Mr. James S. Johnson, who wrote from Frankford, Pennsylvania, in August, 1880, and said:

"Hyphantria textor (Harris) made its appearance in this locality on May 10th, and from that date to the 13th I captured 53 ♂ examples and 10 ♀."

"On June 17th the second brood appeared, and in three days I took 41 ♂ and 10 ♀."

* * * * * * *

"In the first brood every male had the black spots on the primaries, from a single spot on each wing to almost covered, *and in some examples a spot on the secondaries*. In the second brood all were bright, not an example with the least trace of a mark, *the females in both broods entirely white.*"—CAN. ENT., vol. XIII., p. 18.

The italics in the above quotation are mine.

Mr. Johnson asked these questions: "Has the first brood, or that which remains over winter only, the black spots? or does *H. textor* alternate?"

As far as my knowledge extends, these questions have not been answered. No one has come forward to say, "From eggs laid by *H. textor* I have raised a brood of *H. punctatissima*," or, *vice versa*, "From eggs laid by *H. punctatissima* I have raised a brood of *H. textor*." If I am mistaken in this I shall be glad if someone will tell me *when* and *where* and *by whom* the statement has been made.

As regards our northern examples of *textor*: I have ten moths (males and females) that I have raised at different times from fall webworms. Not one of them has any appearance of a spot at the base of the second fork of the median nerve, such as is shown in "*f*" of Riley's "Fig. 86," in *Packard's Forest Insects*, and "*a*" in "Fig. 87" of the same work.

The dimensions of the moths that come from fall webworms have been given as follows:

In the New England States—One inch and a quarter to one inch and three-eighths—Harris, *Ins. Inj. to Veg.*, p. 358.

In Canada—One inch and a quarter—Saunders, *Ins. Inj. to Fruits*, p. 73.

In the Southern States—One inch and one-tenth—Howard, *Farmers' Bulletin No. 99* (by figures), pp. 24 and 26.

We must accept the dimensions given by these authorities as reliable. From them it appears that the Southern specimens of moths from fall web worms are smaller than the rest. What the very large moths, that have

been mistaken for and associated with H. textor, really are must be determined by further careful breeding.

III.—American Entomological literature is rich in synonyms, and Dr. Dyar seems ambitious to add another to the list (see his "*Correction*" in the January number of the CANADIAN ENTOMOLOGIST).

The following is the description of *Spilosoma prima*, Slosson :

" Size of *S. virginica*, but a stouter insect, body heavier and shorter, scarcely reaching anal angle of secondaries. Primaries sordid white, stained with ochreous, especially along costa and inner margin, and with scattered dots of dark brown. These are arranged almost exactly as in some specimens of the form of H. textor, Harris, known as *cunea* and *punctata*. The dots are much heavier and more distinct on costa, and there is a submarginal line very plainly indicated and composed of geminate dots on the venules. Secondaries sordid white. Abdomen thickly clothed with white hairs, through which can be seen the yellow of the body, with dorsal row of black spots. Palpi, coxæ and tibiæ very dark smoky brown, almost black."—*Ent. Amer.*, V., 40 (1889).

And these are some of the points in which this insect seems to differ from the Spilosoma taken at Quebec and believed to be the *Bombyx cunea* of Drury :

S. PRIMA, SLOSSON.	THE QUEBEC INSECT.
Size of *S. virginica.*	Smaller than *S. virginica.*
Stouter than Virginica.	Not so stout as Virginica.
A submarginal line of geminate dots on primaries.	A submarginal line of dashes and streaks on primaries.
Secondaries sordid white (no mention of spots).	Secondaries much spotted, as in Drury's figure.
Dorsal row of black spots on abdomen.	Five rows of black spots on abdomen (Drury's figure shows dorsal and side lines. The under side of the insect is not figured).
Tibiæ very dark smoky brown.	Tibiæ white on the outside, dark brown on the inner.

But supposing *S. prima*, Slosson, were shown to be identical with the insect I have described, that would not prove that *Phalæna punctatissima*, S. and A., is one with *B. cunea*, Drury : it would rather indicate that we have had one more synonym in our literature than we have been aware of.

I do not know that I can say any more on the subjects that we have had under discussion. I trust that I have written with befitting modesty, and that I have given the reasons for my statements with sufficient clearness. After weighing all that has been written, I am convinced that Hyphantria *textor*, Harris, *is not* one and the same with *Bombyx cunea*, Drury, and that the insect I have described as *cunea* more closely corresponds to Drury's figure than any other moth, or any figure or description that has come under my notice.

NOTE ON CYANIRIS PSEUDARGIOLUS OF BOISDUVAL AND LE CONTE.

BY ARTHUR G. BUTLER, PH. D., BRITISH MUSEUM, LONDON, ENGLAND.

In 1782, Cramer described and figured a *Cyaniris* (Pl. CCLXX., figs. D, E), and incorrectly gave the Cape of Good Hope as its locality.

In his "Rhopalocera Africæ Australis," Mr. Trimen described the species from a single example labelled "S. Africa" in the British Museum collection, and stated that this was the only example he had seen. In his later work this species is ignored, Mr. Trimen having evidently satisfied himself that it never came from any part of Africa. On looking up the authority for the locality of the specimen mentioned by Trimen in our oldest "Register of Accessions," I find it entered as "*P. Ladon*, Cram., n., S. Africa?" the locality having evidently been entered on Cramer's authority.

As a matter of fact, Cramer's insect is undoubtedly *Cyaniris pseudargiolus*, which it necessarily supersedes, and our reputed African example is a large specimen of the form *marginata*, rather less suffused than usual on the under surface.

It is always inconvenient to alter the names of well-known and abundant species, but under the circumstances I do not see how it can be avoided in the present instance: it will perhaps have one advantage — as *C. pseudargiolus* is not half so nearly related to *C. argiolus* as it is to the Sikhim species, *C. dilectus*, an inappropriate name is suppressed.

A NEW OAK-GALL FROM NEW MEXICO.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Dryophanta Porteræ, n. sp.— ♀. Length, 2⅓ mm.; very dark brown; cheeks, tibiæ more or less, tarsi, and antennæ except tips, clear ferruginous; smooth and shining, parapsidal grooves distinct; head transversely quadrate, broader than long; antennæ 13-jointed, 13 a little longer than 11 and 12, 3 about a third longer than 4 (3 about 200 μ, 4 about 150 μ, 13 about 180 μ); scutellum prominent; ovipositor rather long, ferruginous, its apical portion with six rings, counting the apex as one;

wings delicately hairy, marked with blackish, nervures suffused with black, marginal nervure almost but not quite attaining the costa at its distal end; a suffused black cloud beneath the end of the marginal cell, a double one in the apical field, a small and indistinct one beyond the apex of the marginal cell, and a faint cloud on the lower part of the wing.

Gall.—On under side of leaf of *Quercus undulata* (true *undulata*, not *Gambelii*), on each side of midrib, sometimes as many as eight on a leaf; gall a thin-shelled depressed sphere, light ferruginous, rather shiny, smooth, surface microscopically tessellate, basal portion with a thin inconspicuous pubescence.

Hab.—Las Vegas Hot Springs, N. M., Jan., 1900 (*Miss Wilmatte Porter*). Fly emerged Jan. 30. I had taken the galls to be those of *D. glabra*, Gillette, which I found in Wet Mountain Valley, Colorado, on leaves of *Quercus Gambelii*. The fly, however, proves quite different from that of *glabra*, and more nearly allied to *D. pulchripennis*, Ashm., and *D. bella* (Bassett). From both of these it differs by the 13-jointed antennæ; from *pulchripennis* also by its dark colour, from *bella* by the much smaller galls. The only other western *Dryophanta* which has 13-jointed antennæ in the ♀ is *D. nubila* (Bassett), but this has densely hairy galls.

PYRAMEIS HUNTERA, N. VAR. FULVIA.

BY G. M. DODGE, LOUISIANA, PIKE CO., MISSOURI.

Expanse one and six-eighths inches. It differs from the usual form of Huntera by its smaller size, its paler colour, and by being more broadly fulvous. The fuscous of the primaries is reduced to a black crescentic line at end of discal cell, a dark costal border and a small patch at apex enclosing the white spots. This apical patch is pale, and is outwardly invaded by fulvous.

The large, somewhat crescent-shaped spot that extends from the costa is fulvous, scarcely lighter than the surrounding parts, and is margined, inwardly, with a narrow black line.

On the posterior half of the wing the usual black marks are much reduced in area.

On the secondaries the costal shades are small and pale. The border is narrow, merely a line of crescent-shaped black spots, sharply defined by an outer fulvous line, beyond which a series of dark spots dot the margin, interrupting the white fringe.

Below much like typical Huntera, but paler and showing less blue.

Fulvia appears to be a spring form of Huntera, perfectly fresh examples being taken here May 2nd to 12th. It varies slightly in showing more or less of the dusky clouding, but its small size and pale fulvous primaries distinguish it at a glance from typical Huntera, in which the apical half of the wing is black.

Mailed February 27th, 1900.

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NOTES ON CAPTURES OF LEPIDOPTERA.

BY E. FIRMSTONE HEATH, THE HERMITAGE. CARTWRIGHT, MANITOBA.

A constant succession of surprises has taken place during the year 1899, owing to the absence of species and even whole genera that I have taken in previous years in some abundance, their places being occupied by forms new to me. I thought that the list of Manitoba Lepidoptera by Mr. Hanham, now being published, would be fairly complete, considering the amount of material at his disposal; but my work of last summer, so far as I have identified the result, will add several species to the list, and I have yet a number of specimens, about which I am in doubt, to submit to Dr. J. B. Smith, who has very kindly undertaken the task of naming my new things.

A few Tæniocampas appeared at the catkins of the White poplar on and after April 26th, but not in anything like the numbers I have seen in other years. Besides a few *alia*, Gn., I netted one or two *subterminata*, Smith, and *Pachnobia salicarum*, Walk. I had, unfortunately, neglected to provide myself with some molasses and was unable to sugar any trees, and had to make flying shots at my game.

I took *Homoptera minerea*, Gn., on May 24th, at sugar for the first time, in two or three varieties and subsequently rather plentifully.

Acronycta illita, Smith, appeared on May 30th and subsequently. On June 2nd I took a few things at light, including *Smerinthus cerisyi*, and at sugar, *Prochœrodes clemataria*, S. & A., of which I took one or two more on the next few nights following.

On June 6th I had a fair take at light of Sphingidæ—*albescens*, *excæcatus* and *cerisyi*.

About the 16th the genus Acronycta came out strongly, several species coming to sugar, and the genus continued to be well represented for several weeks, some new species being added to my collection, including *revellata*, Smith; *albarufa*, Grote; *leporina*, an Old World species which does not appear in Smith's list (1891); *hastulifera*, S.& A.; *noctivaga*, Grt.; *superans*, Gn.; *modica*, Walk., and *oblinita*, S. & A. *Thyatira scripta*, Gosse, also appeared rather freely.

On the 22nd I noticed a large Sphingid hovering over my sugared trees just at dusk, and netting it, I found it to be *Ampelophaga chærilus*, Cram. On subsequent nights I secured one or two more, but it is a most difficult insect to take, as it imbibes the sugar while on the wing, without settling, and darts away on the tree being approached. I have never taken this species at light, nor any other Sphingid at sugar.

On June 24th *Zale horrida*, Hbn., and *Hadena miselioides*, Gn., came to sugar, and a few days later *Diphthera fallax*, Hbn.

On July 2nd, among other things at sugar, I secured my first and only specimen of *Copablepharon subflavidens*, Grt.

The best catch I had at light was on the night of July 5th. In the earlier hours I took *Notodonta dimidiata*, H. & S.; *elegans*, Strk., and *stragula*, Grt.; a Cerura, several Schizura, Schinia, Eubyia; *Platypteryx arcuata*, Walk.; *Dasylophia anguina*, S. & A., and a few Arctias and Plusias. From 1 to 2 a. m., on the 6th, *Triptogon occidentalis*, Hy. Ed., was almost a nuisance. I believe if they had only charged together they would have broken my windows. I have to work outside, and defy the mosquitoes, with my lamp inside the glass. I notice that while the other Sphingids, *albescens*, *geminatus*, *cerisyi*, *excæcatus* and *myops*, appear from 10 to 11 p. m., Triptogon hardly ever shows up till after midnight. I did not take an example of *Cressonia juglandis*, S. & A., which is generally rather plentiful. The genus *Plusia* was very sparingly represented last season. I hardly took any, the most notable catch being a single *precationis*, which is a decided rarity hereabouts. Arctias were not so abundant as usual, but I took several *virgo*, Linn., which hitherto had been represented by a single example in my cases.

About this date several beautiful specimens of *Maria florida*, Gn., were bottled off the window.

The genus Mamestra was well represented at both light and sugar.

My catch included *mystica* and *incurva*, Smith; *Farnhami*, *Dimmocki*, *grandis*, *subjuncta* and *neoterica*, Smith. In regard to *incurva*, Dr. Smith tells me that the specimens in his collection come from New Mexico, but that he cannot see any difference between them and that I have sent. I have another specimen so named which was sent by Mr. Hanham to, I believe, Dr. Smith for identification, but my last example being fresher and brighter, I was not quite certain of it and sent it again. It would appear, therefore, that this species has an extraordinary range—from Manitoba to New Mexico—or that we have here a closely allied and almost indistinguishable species.

The Catocalas were pretty well represented. Though I did not make any addition of species to my collection, I took an "*Aspasia*," Strek.; the only one I saw. *Relicta* came out in various degrees of mourning: from "complimentary"—almost white, to the "deepest weeds"—nearly black. *Præclara*, G. & R., was more plentiful than usual, so was *grynæa*, Cram; while *concumbens*, *parta* and *briseis* were in normal quantities; *unijuga* was less plentiful.

In the early days of August I took at sugar *Adita chionanthi*, S. & A., which is, I think, an addition to our Manitoban list, and also some of the small pale variety of *Hepialus argenteo-maculatus*, besides the ordinary form, of course on the wing.

The Calocampas, Xylinas, Polia, etc., occurred in about their usual numbers. I also took several *Hadena plutonia*, Sm., and, of course, our *allecto*, Sm.

Dr. Smith tells me that I have sent him a Nonagria of a species different to that mentioned in Mr. Hanham's list, being smaller and darker, and also a Cosmia, which he has received from the Yellowstone, and which, as yet, is not described and named. The genus Hydrœcia was poorly represented Several species are generally taken here pretty freely, including *obliqua*, Harv.: *rigida*, Grt., and *frigida*, Sm., and I have also taken *nelita*, Strk. I have been sending some lately to Mr. Hy. Bird, of Rye, N. Y., and I am pleased to find, on his authority, that what I supposed to be *rutila*, Gn., is really the new species *circumlucens*, Sm. I hope this coming season it may appear in like numbers to some previous years.

The last moth I saw at sugar of any value was on Oct. 10th, when I took a very good specimen of *Eupsephopœctes procinctus*, Grt. With the exception of one or two nights, things did not come at all freely to

lights—always excepting mosquitoes, which were terrible, and very often at sugar the moths were so wild that they would hardly allow me to get near enough the trees to net or bottle them, and as well as I could judge, by the faint light of my collecting lamp, one or two new species in single examples got away from me, and left me lamenting.

Butterflies of all genera were scarce during the year. Even the common prairie species were not so plentiful as usual. The *Blues* were in much smaller numbers. Hardly a Grapta came to my sugared trees. I saw very few *P. atalanta*, and not a single *Vanessa californica*, so different from 1898. Even *Antiopa* was scarce. I did not see a single *Pieris protodice*, and the Pamphilas belonging to the autumnal species were very scarce.

Throughout the summer, at intervals of a week or ten days, my sugared trees were visited by single specimens of *Scoliopteryx libatrix*, Linn., all freshly evolved from the pupa. With such a wide distribution, in point of time, and irregular appearance, it is a wonder that the species manages to reproduce itself in any number.

Ufeus plicatus, Grt., was not quite so numerous as usual. I have never seen it outside my house, either at light or at sugar, but I have had in some years two or three in one evening commit suicide in my lamps.

When the examination of my captures is completed I purpose sending a list of my novelties for insertion in the CAN. ENT., as supplementary to Mr. Hanham's catalogue.

SOME NEW NORTH AMERICAN SPIDERS.

BY NATHAN BANKS, EAST END, VA.

Sergiolus bicolor, n. sp.

Length, ♀, 8 mm. Cephalothorax and legs pale reddish-yellow, mandibles and sternum scarcely darker, basal half of abdomen pale gray, apical half and spinnerets jet black, the line separating the two slightly convex in front; venter pale gray except the apical two-fifths, which is black, but broadly indented by the gray in the middle. Cephalothorax rather slender, about one and three-fourths as long as broad, plainly longer than patella plus tibia IV., not much narrowed in front, no trace of a dorsal groove. Posterior eye-row plainly recurved, the P. M. E. round, about twice their diameter apart, and about as far from the scarcely larger P. S. E. Anterior eye-row much shorter than posterior, nearly straight, the A. M. E. slightly smaller than P. M. E., more than their diameter

apart, and rather nearer to the slightly larger A. S. E., several stiff black bristles in eye-region. Mandibles stout, hardly porrect, with many long, stiff, black bristles in front; palpi with many stout bristles, especially toward tip and on the under side; legs short and stout, metatarsus I. much shorter than tibia I., with but few hairs; three black spines above on femora I. and II., none below on tibia I., one pair at tip below on tibia II., two pairs below on metatarsi I and II., one pair near base, other at tip; hind legs with more spines on tibiæ, one above near base. Sternum narrow, broadest in middle, pointed behind. The abdomen is about twice as long as broad, rather rounded at base and pointed at tip, slightly depressed, spinnerets prominent; epigynum small, in a reddish area, showing two circular cavities connate on the middle line, each opening behind into a dark cavity beneath the surface.

Covington, Louisiana; May. (Hugo Soltaw.)

Callilepis insularis, n. sp.

Black. Resembling *C. pluto*. Bks., but legs paler (rather yellowish-brown), the two rows of eyes closer together, the P. M. E. oval and not half their diameter apart. A. M. E. smaller and about their diameter apart, closer to the A. S. E.; sternum rather longer than broad, narrowed in front and pointed behind; abdomen depressed; no spines under tibia nor metatarsus I., many on hind pairs; epigynum very different from *C. pluto;* a cavity rather longer than broad, slightly indented on each posterior side, and divided by a septum, narrow at base and twice as broad near tip; the tip not quite reaching hind border of cavity; each side of the cavity at base is a dark line with the tip recurved toward the middle. Length 6.5 mm.

Two specimens from Guadeloupe Isle, off California; June, 1897. (Leland Stanford, Jr. Univ. Coll.)

Euryopis 5-maculata, n. sp.

Length, ♀, 2.7 mm. Cephalothorax black, palpi black, sternum rather paler in the middle, mandibles yellowish, black on tips, legs pale yellowish, with black stripes on each side of anterior coxæ, and a black stripe on fore side of femora I., II., and III., and on apical part of IV., and on hind part of patellæ and tibiæ III. and IV.; abdomen black above and below, rather paler in middle of venter, and a pale spot on region of epigynum; above are five clear white spots: one on each anterior side, one each side near middle of length, and a median one at tip just above spinnerets, all subequal in size. Cephalothorax one and one-fourth times

as long as broad, sides rounded, head high, projecting over clypeus; eyes subequal, posterior eye-row recurved. P. M. E. one and one-half their diameter apart rather farther from the equal P. S. E., A. M. E. smaller, about twice their diameter apart and scarcely so far from the barely larger A. S. E., which latter are only slightly separated from the P. S. E., the A. M. E. are in the upper anterior margin of the elevated head; mandibles small, weak, slightly divergent; palpi large and hairy, last joint heavy; maxillæ including labium; sternum convex, broadest at middle, truncate between hind coxæ, legs of moderate length, IV. pair longest, no spines, but with many scattered stiff bristly hairs, one almost spinelike, erect near tip of patellæ; tibia III. scarcely longer than patella III.; abdomen nearly twice as long as broad, rounded at base, pointed behind, convex above, and with many scattered pale hairs. Two specimens of this very pretty and distinct species: one collected by Mr. Pratt in April, at Washington, D. C., is not quite adult; the other taken at Falls Church, Va., in June.

Coleosoma floridana, n. sp.; *C. blanda*, Keys., nec Cambr.

This is very evidently not Cambridge's species, which has a shorter cephalothorax, more prominent clypeus, differently marked abdomen, less constricted, and the palpus is different. Otherwise it is similar. Keyserling's description is very good. It would seem very strange for a spider to be described from Ceylon and then recorded from Florida without being known from any other tropical regions. One male was collected by Mrs. A. T. Slosson in Florida.

Argyrodes floridana, n. sp.

Length, 2.6 mm. Cephalothorax dark brown; mandibles pale at base, blackish towards tips; palpi black, except pale tips; sternum blackish; legs pale uniform whitish; abdomen blackish, jet black around spinnerets, paler above; cone pale. Cephalothorax of moderate length; eyes scarcely elevated; clypeus sloping; palpi enlarged; sternum convex; legs slender, of moderate length; abdomen very high at base, continuing nearly straight back and at tip with a prominent blunt-pointed cone behind, vertical to the spinnerets; abdomen one and one-half longer than broad, higher than broad.

One female from Punta Gorda, Florida. (Mrs. Slosson.) Readily known by shape of abdomen, dark coloured abdomen and pale legs.

Crustulina borealis, n. sp.

Length, ♂, 1.8 mm. Similar to *C. sticta*, but the abdomen wholly

black, the size smaller, and the femur of palpus less swollen at tip, the two projections of the tarsus are more equal than in *C. sticta*, the P. M. E. are about their diameter apart, the small conic elevations under femora I. and II. are not as large as in *C. sticta*.

Two males from Washington State, Olympia. (Trevor Kincaid.)

Our four species of this genus may be tabulated as follows:

1. Silvery spots on dorsum, cephalothorax reddish.....*guttata*.
   No silvery spots, cephalothorax nearly black.....2.
2. Abdomen yellowish, metatarsi and tarsi dark.....*lascivula*.
   Abdomen darker, legs uniform pale.....3.
3. Abdomen reddish.....*sticta*.
   Abdomen black.....*borealis*.

Philodromus inæquipes, n. sp.

Length, ♀, 3 mm.; femur II. 1.5 mm. Cephalothorax pale yellowish, on sides more brownish, abdomen grayish white, near tip on each side is a short red-brown stripe legs and palpi pale, there is a black line on the posterior under side of the coxæ, femora and tibiæ of legs I. and II., on both sides of leg III., and on the anterior under side of leg IV. The P. M. E. are nearer to the A. S. E. than to any other eyes. The sternum is very wide in front, and the hind coxæ widely separated. The legs are very long, especially the second pair. The abdomen is about one and one-half times as long as the cephalothorax; the sternum is very wide, and almost as wide in front as anywhere, hind coxæ separated by half their length; femur II. longer than the cephalothorax; legs very long; body and legs closely pilose. Washington, D. C. Separated from our other species by black lines on legs, broader sternum, and longer legs, especially the second pair.

Runcinia californica, n. sp.

Length, 5.5 mm.; tibia plus patella I., 4 mm. Cephalothorax dull yellowish, with an even straight brown stripe each side and a narrow median one reaching only to end of pars cephalica, all connected through the eye-region, but the ridge under the S. E. is white; clypeus with a brown spot each side connected to a stripe that runs down the outer side of each mandible and covers its tip; legs pale yellowish, leg I. with an oblique mark at tip of femur, an apical band on patella, basal and apical bands on tibia and a preapical band on metatarsus, brown; leg II. with the under side of femur brown, otherwise as leg I.; hind legs unmarked; sternum yellowish. Abdomen yellowish, with

a brown stripe on each anterior side, and a pair of brown stripes above, which are widely separated in the middle, but united at either end; these on the posterior sides throw off oblique marks running down the sides; venter pale, with a brown mark before spinnerets. Femur I. much longer than cephalothorax, which is about the length of tibia I.; eight pairs of spines under tibiæ I. and II., pairs under metatarsi I. and II. The M. E. form a quadrangle barely, if any, higher than broad. The epigynum shows a small cavity, truncate in front, broadly rounded behind, and divided by a septum.

Los Angeles, California. (Davidson.)

Epeira arizonensis, n. sp.

Length, 4.2 mm. Pale yellowish, nearly uniform, the abdomen more whitish yellow, no marks on the legs or anywhere else. The abdomen is nearly as broad at basal third as it is long; in the ♂, however, much narrower. The base is broadly rounded, and the angles rather prominent, but not humped. Seen from the side it is evenly rounded to the spinnerets. The epigynum has a rather broad and short finger, upturned at the tip, each side is an oval cavity uniting on the middle. The male tibiæ I. and II. have two pairs of long spines beneath and an apical short pair, the tip is not curved or thickened.

Arizona. (Townsend.)

Acrosoma maculata, n. sp.

Length, ♀, 5.2 mm. Cephalothorax uniform dark brown, about twice as long as broad, broadest in middle, about as broad in front as behind, a depressed furrow slightly before the middle; legs of moderate length; femur I. a little shorter than cephalothorax, legs yellowish, tibiæ, patellæ, and apical half of femora I. and II., dark brown, on hind legs a brown ring on tips of femora, patellæ, tibiæ, and metatarsi; abdomen about twice as long as broad, sides slightly convex, but hardly twice as broad in middle as at base; at basal third above is a small conical hump or spine each side; at apex are four conical spines, the superior pair semi-erect, not divergent, the inferior pair directly below superior pair, shorter, horizontal and scarcely divergent. Abdomen black, marked with yellow spots, a double spot each side at base, followed by four spots in a row on each side, the apical spot being larger and having an extension upon the outer side of the superior spines; between the sub-basal humps is a pair of yellow spots, and behind them a median one transverse, toward the apex is a pair between the third of the lateral row, and between the bases of the

superior spines is a yellow mark ; the sides have small yellow spots, and on the venter there is a curved row or stripe each side, which unite beyond the spinnerets ; sternum brown.

Arizona. (Townsend.) Easily distinguished from any of our other Acrosomas, but nearly allied to *A. mitrata*, Hentz.

Habrocestum signatum, n. sp.

♂.—Length, 4.5 mm. Cephalothorax brown, clothed with red hair on clypeus, gray on eye-region, on side margins, and on each side behind leaving a median nearly black stripe. Abdomen clothed with gray hair above, with a curved brown stripe each side uniting at apex, and near there connected by several faint dark chevrons ; near base is a median diamond-shaped dark brown mark, touching each stripe. Legs pale yellowish, a dark spot at tip of the patella, leg I. more reddish, the femora with several bunches of short black hair on under side near tip, nearly fully the length under the patella and tibia, on latter broad and heavy, especially at base, where there are black scale-like hairs (no bunch above on tibia as in *H. hirsutum*) ; elsewhere the legs are clothed with long white hair. Patella III. not modified, but nearly as long as tibia III. Under side of body clothed with gray hair. The spider, when dry, has a general hoary appearance. The female which appears to belong to this species is 6 mm. long ; it has a dark cephalothorax clothed with gray and yellowish hair ; clypeus white with a white fringe on margin and over eyes ; legs pale yellowish, darker on outside of tibiæ and metatarsi ; dorsum of abdomen dark brown, a median pale irregular stripe on posterior half, and each side the pale runs up in an oblique manner ; venter pale. The palpus of male much on the style of *H. hirsutum*, but with the stylet not near as long and the projection from tibia more acute ; at base there is a stiff bristle-like projection or hair, which lies across the base of the bulb.

Los Angeles, Calif. (Davidson.)

Scius cinctipes, n. sp.

Length, 3.7 mm. Cephalothorax black, two large oblique red-brown spots behind the eye-region, nearly touching on the middle line, clothed above with white hairs, more yellowish in front ; mandibles yellowish brown ; legs yellowish, banded most distinctly from below with brown ; one on anterior femora, two on hind femora, one on patellæ, one on tibiæ, two on metatarsi, and one on hind margin of hind coxæ ; palpi also banded. Abdomen pale grayish, with many brown spots of irregular

shape, a median brown stripe, interrupted at posterior third, with two projections each side, the posterior one often connected to the side markings; on the posterior third the abdomen is mostly brown, with a few pale chevrons; sides brown, with rows of pale dots; venter pale, with brown spots and a brown central stripe; superior spinnerets brown, others pale; sternum pale, dark on sides. Cephalothorax low and flat, projecting over the mandibles, about one and one-fourth times as long as broad, broadest slightly behind dorsal eyes; eye-region a little broader behind than in front, one and three-fourths times as broad as long, occupying about two-fifths of the cephalothorax; M. E. very large and nearly touching; S. E. well separated from them and a little above, dorsal eyes equal to S. E., those of second row a trifle nearer to S. E.; legs short, femur I. very stout, IV. pair longest and most slender, metatarsus I. no longer than tarsus I., three pairs of spines under tibiæ I., one under metatarsus I., fore coxæ separated by width of lip; sternum pointed behind, about twice as long as broad. The epigynum shows a cavity twice as broad as long, evenly convex behind, biconcave in front, the sides pointed. Baton Rouge, Louisiana; May. (H. Soltaw.)

SOME NEW SPECIES OF GEOMETRIDÆ.

BY GEO. D. HULST, BROOKLYN, N. Y.

Tephroclystis plumbaria, n. sp.

Belongs to the *absinthiata* group, and is close to that species. Of a blackish fuscous colour, wings broad and rounded, lines faint, parallel with outer margin, evenly scalloped, the outer one most distinct and whitish. Costa with small black spots at beginning of the lines; discal spots on fore wings black, lengthened, on hind wings black points. Beneath lighter, smoother, the lines showing more evenly, more broadly and lighter. Dist. of Columbia, taken July 5th. Type number, in National Museum, 4701.

Tephroclystis Bolterii, n. sp.

Expands 21 mm. Palpi porrect long, heavy, dark fuscous; front dark fuscous; thorax fuscous gray; abdomen dark fuscous; fore wings narrow, pointed, light gray, somewhat fuscous, stained with a number of indeterminate wavy darker parallel cross lines, these showing more clearly at costa; discal spot black, lengthened, with black dash above on costal vein; three black dashes outside, beyond cell; median vein black lined and connecting with discal spot; an extra discal cross line of venular

black dashes, and indications of cross lines along inner margin; discal spots faint; beneath nearly colour above, fore wings with fuscous shadings along costa and on anterior half, the hind wings with corresponding shading on anterior margin.

Texas; from Mr. A. Bolter.

Tephroclystis lachrymosa, n. sp.

Expands 24 mm. Palpi short, light; these, with front, thorax, and abdomen, blackish fuscous; wings broad, rounded, loosely scaled, dark sordid fuscous, very slightly broken into indeterminate lines; two or three lines of short black dashes across fore wings, beyond cell, and a pretty clear submarginal white line parallel with the outer edge; discal spots diffuse, black; hind wings lighter basally; discal spots faint, blackish; beneath lighter fuscous, the colour above showing brokenly on costa and apex of fore wings, and outwardly on hind wings, there showing in rounded lines; discal spots black.

Oregon.

Tephroclystis plenoscripta, n. sp.

Palpi very short; these, with front, thorax, and abdomen, light gray; the abdomen much darker on the two anterior segments; fore wings overlaid with black scales running into groups of parallel lines, those basally rounded, angulate, not very distinct, the middle ones with a sharp, strong angle at discal point, another inwardly at median vein, then outwardly at vein 2, and then wavy to inner margin; outer space with lines subparallel with margin; the veins black pointed, with two whitish lines, the inner smooth, broadish, the outer finer, subdentate; discal spots distinct, black; hind wings with darker scales outwardly and along inner margin, the lines showing on inner space; discal spots faint; beneath fuscous to light gray, the lines showing more broadly, especially on anterior half of fore wings.

Yellówstoñe Park, Wy., July 8–15. National Museum, type No. 4702.

Tephroclystis tenebrescens, n. sp.

Expands 28 mm. Much like preceding species, palpi longer and heavier, and the insect considerably larger; colour more even fuscous gray, with a slightly brownish tint, with lines, except submarginal white line, less distinct, and only indicated by dark shadings on veins; submarginal line quite distinct, whitish, evenly scalloped between the veins; hind wings concolorous with fore wings, the lines indicated only by

shadings ; all discal spots present, black ; beneath fuscous gray, even, an extra discal cross line, rather broad, showing on hind wings ; discal spots present, black.

Texas.

Philereme nigrescens, n. sp.

Size and general form of *P. californiata*, Pack., but with fore wings of a clear even black gray, two cross lines of extra discal whitish venular dots, and a broken submarginal scalloped white line ; hind wings blackish gray outwardly, becoming lighter basally ; beneath even dark blue-gray, a broad, slightly lighter line extra discally on hind wings.

Oregon.

Hydriomena amorata, n. sp.

Size and lines very much as in *H. custodiata*, Guen. The fore wings, however, are more pointed, the hind wings somewhat wavy edged, the middle band of the fore wings with a reddish shading, becoming in some specimens bright reddish brown ; beneath very light, the cross band hardly showing except at costa, the apex shaded with reddish brown, the hind wing black, shaded outwardly with indistinct lines.

S. California.

Cœnocalpe cœnonymphata, n. sp.

Expands 25–28 mm. Front and antennæ fuscous brown, the thorax and abdomen lighter ; palpi short, rather stout, fuscous brown, blackish on end ; fore wings fuscous brown on anterior half, fuscous ochre on posterior half and basally, the colour of the costa broken by three spots of the posterior colour, the outer continued in a broad cross line with the posterior colour, enclosing a subquadrate darker space, the line or band apparently returning around the spot to costa. Apex dark, in triangular shape ; hind wings fuscous ochre, a shade darker basally on first third, showing the darker under side ; beneath fore wings marked as above, but darker, the broad outer line rectangularly bent at vein 4, the posterior angle being fuscous ochre, the costa being marked with reddish brown ; hind wings very much darker than above, with broad light coloured cross lines at middle, nearly white, with rectangular sinus outward below discal spot, which is large and whitish ; outer half mixed with reddish ; marginal space rather lighter.

Pasadena and Yosemite Valley, Cal. Very closely resembling in general appearance some forms of *Cœnonympha ochracea*, Edw.

Synelys pergracilis, n. sp.

Expands 29 mm. Fore wings rusty white, basal line black, sinuous, distinct, beginning about one-third length of wing out, running very obliquely to near base on inner margin; middle field dull white; discal spot pure white, oval; outer field brown, less so towards apex; outer line black, sharp, unevenly sinuous, very oblique; this is followed by a light, even, rather broad, and another submarginal light line, evenly and regularly scalloped; a row of marginal black points; hind wings corresponding with fore wings in lines and colour, the basal line very close to base, the outer black line beyond discal point; on both fore and hind wings the outer black line is edged with reddish outwardly; beneath light ochreous, the fore wings stained somewhat with fuscous.

South Florida.

Eois Crossii, n. sp.

Expands 16 mm. Head and thorax in front, yellow; thorax behind, and abdomen, reddish violet, the abdomen interlined with yellow; fore wings reddish violet, base and costa yellow, the basal part mixed with violet, the wings crossed with three faint irregular tremulous and angulate lines; hind wings reddish violet, with lines as in fore wings; beneath, reddish pink.

Florida; from Mr. Edward Winslow Cross, in whose honour I name this insect.

Eois purpurascens, n. sp.

Expands 15 mm. Fore and hind wings of a bright rust colour, the outer margins with a broad band, purple in colour, somewhat broader at apex; the wings are crossed by about three faint indeterminate cross lines of a deeper red or red-purple colour; the fore wings have the basal half of costa yellowish, the base being purple; thorax yellow; abdomen purple.

Cocoanut Grove, Fla. National Museum, type number 4699. The head and part of the abdomen of the type are gone, but the wings are fresh and clear, and the insect is a very distinct one.

Nemoria Dyarii, n. sp.

Expands about 16 mm. Front and collar orange red; thorax green, yellowish behind; abdomen yellowish, washed with violet red above; wings deep yellowish green, on anterior and outer margins edged with reddish violet, the costa and fringes being of this colour; the fore wings have indications of cross lines, basal and outer, these faint, broken and

irregular; corresponding lines also indicated on hind wings: beneath, much lighter yellowish green, the edges of the wings reddish, the base of fore wings also washed with the same colour. Either from L. I., N. Y., or from Dist. Colum.; collection of Dr. H. G. Dyar, to whom I dedicate it. National Museum, type No. 4700.

Cymatophora evagaria, n. sp.

Expands 26–29 mm. Head, thorax, and abdomen light ochre, the abdomen more yellowish; fore wings light ochre washed with fuscous, this being heavier on the outer third; costa very much rounded, especially at apex, outer edge falcate; faint indications of cross lines, three in number, showing especially in fuscous at costa; hind wings light ochre, slightly fuscous washed; beneath as above, the markings more decided, and lines faintly showing on hind wings.

Wis., Minn., Ont.

Selidosema delicatum, n. sp.

Expands 38–40 mm. Palpi smoky; front and thorax light ochre or dull white; abdomen dull white with black scales intermingled; fore wings light ochre, with scattered black scales, these thickest basally, and outwardly forming two broad, uneven bands, the outer one with three sinuses outward; an indeterminate submarginal band parallel with margin; hind wings like fore wings, but lacking the basal band; the outer band on all wings has a violet tinge; beneath dull white, the markings above reproduced, but less distinctly.

In a female before me, the markings on the wings are somewhat more distinct and pronounced than in the ♂; the submarginal line is blackish, dentate, quite distinct; it is also considerably darker on the under side.

Wilson's Peak, Cal., Sept. 26; from Mr. Kemp.

Therina lugubrosa, n. sp.

With the lines and size of *T. fervidaria*, var. *somniaria*, Hulst., but of an even, dark, soft, smoky, fuscous colour, the middle field somewhat lighter, the lines scarcely darker than the ground colour, the inner inwardly and the outer outwardly edged with light ochre colour: beneath nearly the same colour, but more indistinct.

Rossland, Brit. Colum. I have a number of specimens which are quite uniform. It is quite likely, however, it may be ultimately found to be a variety of *T. fervidaria*, Hubn.

Therina lata, n. sp.

Expands 27 mm. Smaller than any other *Therina*, the colour very nearly the shade of *T. fiscellaria*, Walk.; inner line straight, the outer angled below costa; hind wings with line straight; fore wings even on outer margin; beneath lighter, unicolorous.

N. Mex.

Stenaspilates albidula, n. sp.

Expands 38–40 mm. Very much in lines like *S. Meskearia*, Pack., but ground colour nearly white, and other markings very much lighter, and the insect is considerably larger: the margins of the wings differ in being almost entirely even in outline.

Colo., N. Mexico. National Museum, type No. 4698.

Caberodes subochrearia, n. sp.

Expands 42 mm. Much as *C. confusaria*, Hubn., in ground colour, but with reddish brown cross lines, the basal evenly rounded, the outer angled at costa, then straight to inner margin, nearly joining the basal line there; a single line on hind wings, this being a continuation of the basal, not the outer line; beneath more reddish brown, the outer line present on fore wings, this being doubled at costa: the line of hind wings wanting; discal spots present above and below on all wings.

New Jersey; from Mr. Kemp. I have the female only, so the generic determination may not be correct.

NOTE ON GORTYNA EREPTA.

BY A. R. GROTE, A. M., HILDESHEIM, GERMANY.

This species was described from material collected by Prof. Snow in Douglas Co., Kansas, and the type is in Coll. British Museum. It is now suspected that *Gortyna erepta* may be the same species with *Hydræcia lunata*, and it is to be regretted that an opportunity of examining the type in British Museum Coll. has been passed over. The appearance of the reniform is characteristic in this genus. In *erepta* it is described as "small, a white half-moon in a blackish shade." In *lunata*, "narrow, white oblique lunule, margined by black scales." The reniform spot thus seems to be identically described in both cases. In *erepta* the lines are described as fuscous, simple. In *lunata* as single and whitish. I never saw a noctuid in which the lines were white or paler than the wing, but there is a following pale shade which sometimes persists when the dark line itself becomes obliterate. It seems as though this discrepancy

might be explained away. In the Revised Check List of 1890 the position given to *erepta* is about the same with that accorded elsewhere to *lunata*. In the Washington Catalogue it is doubted whether all the species referred to *Gortyna* or *Hydræcia* really belong there; but this doubt is greatly dispelled by the recent revision of *Hydræcia*, in important part, from Mr. Bird's material and correct determinations. The species are all referred to *Hydræcia*, but the doubt is retained alone for the unidentified species *erepta*. But if now *erepta* were the same species with *lunata*, the doubt must ultimately disappear, while in being able to refer *erepta* as a synonym to *lunata*, a difficulty for the revisionist could be finally removed.

ANTHOCHARIS FLORA.

On page 283 of Holland's Butterfly Book, as to *Anthocharis Flora*, are written the words, "The plates give figures of the types." This is an error. No Eastern man ever saw the types. They are now, and always have been, in my cabinet, and never were out of my possession a moment, and, moreover, have never been copied or figured. At the time I published *Flora*, I sent a pair to Dr. Scudder, and another pair to Mr. W. H. Edwards, typical perhaps they might be called, and these latter are doubtless the ones copied by the Rev. Dr. Holland; but as *Flora* is quite constant as compared with some other members of the genus, the error may be of technical rather than serious importance.

W. G. Wright, San Bernardino, Cal.

We beg to offer our hearty congratulations to Miss Eleanor A. Ormerod upon the distinguished honour that has been conferred upon her. In recognition of her eminent services in Economic Entomology, the University of Edinburgh has offered her the degree of LL. D. This distinction is the more remarkable inasmuch as it is the first time in its history that this University has bestowed a degree upon a woman. Certainly they could not have broken their ancient traditions in favour of a more deserving person. No one in Great Britain has done more useful and important work for the benefit of the whole community, and has laboured more unselfishly for the good of others, than our greatly esteemed friend Miss Ormerod.

Erratum.—Page 87 (March, 1900), 12th line from bottom, for *congrua* read *cunea*.

THE CICINDELIDÆ OF KANSAS.

BY WARREN KNAUS, McPHERSON, KANSAS.

One of the most popular families among the *Coleoptera* to the student and collector is that of the *Cicindelidæ*. Generally bright coloured and handsomely marked, quick to take flight and rapid runners, it requires some skill and considerable patience to become a successful hunter of the "tiger" beetle. Their capture is generally attended with considerable personal discomfort, as their favourite haunt is the muddy bank of a stream, the hot sand bar or dune, or the burning flat of a salt marsh, from which the noon-tide breezes on a July or August day seem to remind one of the temperature of the home of the evil-doer in the hereafter. It is in the hottest part of the day, from 10 a. m. to 3 p. m., that most species of this family appear in the open.

The first collector of Kansas tiger beetles was undoubtedly that notable entomologist, Thomas Say, who crossed the plains of Kansas in 1822 or 1823. At the base of the Rocky Mountains he found a single specimen of the noblest "tiger" of them all, which he afterwards described as *Amblychila cylindriformis*. For the past twenty-five years, or from 1873 or 1874, the homes of the Kansas tiger beetle have been despoiled by such noted collectors as Cooper, Williston, Snow, Brous, Popenoe, Dyche, Ashton, and others of lesser fame, not to speak of the eastern collectors who have ranged over the State along the lines of the principal railways.

In his paper on the "Habits of the American Cicindelidæ," Mr. H. F. Wickham, of Iowa City, Ia., refers to the Kansas collectors as follows: "Perhaps the tiger beetles of Kansas and the adjacent States have received more biographical attention than those of any other portion of the continent, and we find articles treating of their lives from the pens of Profs. Snow and Popenoe, Dr. Williston, Messrs. Cooper, Brous, Knaus, and Jones." My own collections in this family began in 1880, and each year has added to the knowledge of specific habits and haunts.

That Kansas, with her wooded streams, undulating plains, wide stretches of sand and bare saline deposits, is the favourite resort of the Cicindelidæ, is shown by the number of species and their varieties in the cabinets of Kansas collectors. In my own collection are thirty species and varieties, all from well-authenticated Kansas localities.

First on the list comes *Amblychila cylindriformis*, Say, from the clay bluffs south-west of and near Wallace. This large and very desirable

species was first taken in this locality in the summer of 1876, by Dr. S. W. Williston and H. A. Brous, then members of a Yale College Geological Expedition. The following season several hundred specimens were taken by Prof. Snow and his party of the State University, and distributed to the entomological cabinets of America and Europe. This species has not since been taken very abundantly. I have visited this locality about July 1st for two or three seasons, and found about a dozen specimens. The best results in collecting can be had in the early part of a warm, still evening. By the light of a lantern they can be found walking near the base of or along the sides of clay banks. They are seldom seen before sunset in the evening or after sunrise in the morning. But few specimens of this species have been taken outside of Wallace and Gove Counties. Prof. F. W. Cragin, then of Washburn College, Topeka, Kansas, reported finding one dead specimen in the upper valley of the Medicine Lodge Creek, near Sun City, Barber County. From my observations in this locality, it is doubtful if additional specimens will ever be found there.

Tetracha virginica, Linn., is found in Eastern, South-eastern, Central and South-western Kansas. I have taken it during July in the southern part of Woodson County, and in the same month in Republic County; and in Rice, and Barber Counties in August, and in Saline County in July. It is found under stones in dried-up watercourses, in mud cracks, in sloughs and draws during the day, and in the early evening it can be found running over the ground, being crepuscular in its habits.

Cicindela Belfragei, Salé, is found in the valley of the Smoky Hill River, near Salina, and in the Kansas Valley, near Manhattan. I first took it in a sod cornfield on first river bottom six miles south-east of Salina, about July 15th. I found the best time to collect was mid-afternoon. On coming near the insects they would break from cover and run rapidly, but could be easily taken by the hand. Later in the evening they could be found running along sandy roads near the river bank. The species is not at all common, a dozen specimens constituting a successful afternoon's work or catch. Prof. E. A. Popenoe has taken this species on bottom land near Manhattan, and it has also been taken near Lawrence.

C. cursitans, Lec., has been taken by Prof. Popenoe in the Republican Valley in Clay County. It is ant-like in size and is a difficult species to collect.

C. obsoleta, Say, occurs in South-west Kansas. I have a single specimen, taken August 12th, about twenty miles south east of Coolidge.

Prof. Popenoe has taken it near Meade, Kansas, and Geo. F. Cooper records it near Sargent (Coolidge).

The green variety, *C. prasina*, Lec., is associated with *obsoleta*, both occurring sparingly.

C. scutellaris, Say, occurs on sandy ground and sand dunes from Manhattan to the western part of the State. I have taken it sparingly at Manhattan in June, but have found it most abundant in the range of sand hills near Medora, Reno County. It can be found from May the 1st to the middle of June. It is a handsome little species, flies quickly and affords good sport to effect its capture. It prefers scant vegetation to the bare sand, and can be found from 10 a. m. to 4 p. m.

The variety *Lecontei*, Hald., I have found associated with *scutellaris* on sand patches near Manhattan and in sand "blow-outs" on the Republican River, south of Superior, Nebraska. I also took two or three specimens among the sand hills near Medora. They are rather shy and are not common.

C. pulchra, Say, is reported by Prof. Williston as being exceedingly abundant in South-west Kansas, and also along the line of the Union Pacific Railway from Hayes to Wallace. I found one specimen near Coolidge on July 27th. It is the only one I saw in a day's collecting. Prof. Popenoe has taken it near Wallace in July, but in several seasons' collecting there I have never seen one alive; have, however, seen the remains of two or three dead specimens under cattle chips. I am inclined to think if it is abundant it is in the months of May or June, August or September.

C. 10-guttata, Fab., is reported by Prof. Popenoe as being common in Eastern Kansas, frequenting sunny roads and paths in woodlands. I have never taken it in Eastern Kansas, and his reference is principally to the variety *violacea*, Fab., which is without spots and is generally green, although some specimens are a deep blue. It can hardly be said to be common, and is rather difficult to capture owing to its occurrence along wood roads and paths. I have taken it sparingly at Manhattan, and a friend at Onaga, north-east of Manhattan, takes from ten to fifty each season, from May to July. I have also taken a few specimens near Benedict in South-eastern Kansas in June. The present season my friend, J. R. Meade, of Wichita, sent me a beautiful specimen which he took July 7th in a willow thicket just south of the city. This is probably the south-western limit of this species in Kansas. A. W. Jones, of

Salina, has taken one specimen of *scagettata* a few miles south-east of Salina, near the Smoky Hill River.

C. purpurea, Oliv., is found over Eastern and Central Kansas, along clay and red sandy roads. I have found it in South-east Kansas at Manhattan, Kansas, and near Salina; at the latter place in August and September along roadside cuts through a red sandstone soil. It is usually associated with its variety, *splendida*, and an occasional *Audubonii* and *graminea*. The black variety, *Audubonii*, Lec., is found but sparingly with the true species. In all my years of collecting I have found but a single specimen. That was taken in the latter part of August, about five miles north of Salina. Prof. Popenoe has a few specimens taken near Manhattan, and A. W. Jones has two or three taken south-west of Salina a few miles. The green variety, *C. graminea*, Schaupp, is apparently as infrequent in this State as *Audubonii*. I have taken but a single specimen that can be recognized as *graminea*. It is a male and was taken near Salina. A. W. Jones has also taken a few *graminea* in this locality. Persistent yearly collecting along the eastern outcrop of the Dakota sandstone formation in Central Kansas may in the future develop localities where these two varieties may be taken in comparative abundance.

The variety *splendida*, Hentz, I have found in Wilson, Saline and Reno Counties, and Popenoe has collected it in Riley and Shawnee Counties. I have taken it near Salina as early as February and as late as October. Localities are the same as for *purpurea*, and usually associated with the typical species, but more abundant. Have found a single specimen only in Reno County, on a dry sand dune, associated with *scutellaris*.

C. formosa, Say, occurs from Central Kansas westward in Arkansas Valley and northward in Republican River Valley. I have taken it in May west of Brookville and in Saline County, south of Superior, Nebraska, in the latter part of May and in the first of June, and in Reno County in May and the first of June. Its favourite breeding ground is in the scant grass and weeds near the edges of sand dunes and "blow-outs." It has to be approached with care and handled quickly, as it takes alarm easily and is a strong flier. In Saline County it was associated with *scutellaris*; near Superior with *scutellaris* and *Lecontei*, and near Medora with *scutellaris* and *venusta*. In this

locality the species occur in the proportion usually of three *scutellaris* to two *formosa* and one *venusta*.

C. venusta, Lec., usually considered a variety of *formosa*, is claimed to be a valid species by Mr. H. C. Fall, of Pasadena, California. Mr. Fall bases his conclusion on habits and secondary sexual characters, and is undoubtedly correct in his claim.

I have taken it for a number of years in the sand hills near Medora, associated with *scutellaris* and *formosa*, as noted above. It is found, however, much nearer the pools at the bottom of sand "blow-outs" than either of these species. I also took a single specimen of *venusta* on the clay bluffs south of the Smoky Hill River at Wallace, Kansas, in July.

C. fulgida, Say, is reported from Western Kansas, in the valley of the Smoky Hill River, but I have only taken it along the edges of the salt marsh three miles west of Kackley, in Republic County. The present season I found it in numbers on July 7th. The height of its season is probably from June 20th to July 10th. It is taken with *togata* and *circumpicta*, and flies more quickly, but does not run so rapidly as these species. The red markings of some of the specimens had become almost black.

C. vulgaris, Say, occurs over Eastern and Central Kansas. I find it in abundance in Reno County, associated sometimes with *formosa* and *scutellaris*, and at other times with *repanda* and *hirticollis*; usually found on higher and more sandy localities than *repanda*.

C. repanda, Dej., is found in all parts of the State, along mud banks and along the bottoms of dry pools.

The variety *12-guttata*, Dej., is found over Eastern Kansas, but not so abundantly as *repanda* or *vulgaris*. I have taken it at Manhattan, near Osage City, on mud at bottom of coal strippings in June, and the present season I found a single specimen September 17th, under a stone on a shallow on the Verdigris River, near Benedict, Wilson County. A. W. Jones has also taken it near Salina.

C. hirticollis, Say, is reported at Lawrence and Topeka, by Prof. Popenoe as common on sand bars at Topeka. I have taken it August 16th, on sand bar in Arkansas River at Dodge City. The specimens were large and elytral markings wide. The present season I found it on May 27th, on wet bed of pools at bottom of sand "blow-outs," three miles south-west of Medora. It was found only in one locality, associated with *vulgaris* and *repanda*.

C. punctulata, Fab., is common all over the State, May, June, and July, and still later in the season. I find it each season at McPherson, at the electric lights; some of the specimens approaching the variety *micans* in colourings. The green and blue variety, *micans*, Fab., occurs in the valleys of the Smoky Hill and Arkansas Rivers, in West Kansas. I have collected it sparingly near Wallace and Coolidge. At Wallace it is found more frequently on the mud of dry pools and moist mud, associated with *punctulata*.

C. cuprascens, Lec., is found in Lawrence, Topeka, Hutchinson and Rooks Counties, on sand bars and on banks of streams, according to Prof. Popenoe. I have taken but a single specimen, on a salt marsh near Fredonia, Kansas, in June. Also taken occasionally at electric light at McPherson in June and July.

C. macra, Lec., I have taken at Great Spirit Springs, in Mitchell County, in July, and also on sand bar of Solomon River, near Kirwin, Kansas. It occurs at electric lights in Lawrence and Topeka, and I find a few each year in the electric lights in McPherson.

C. sperata, Lec. A variety of this species occurs on the wet mud near the water's edge of streams flowing through salt marshes. I took my first specimens in July, 1885, at the Great Spirit Springs. The past four seasons I have taken this variety in great abundance on the salt marsh near Kackley. During the hottest part of the day they fairly swarm over the hot, steaming mud, a single throw from the net often taking a half-dozen specimens. The variety taken in Kansas is different from that taken in Texas and New Mexico. The Kansas salt marshes probably mark its northern limit.

C. lepida, Dej., occurs sparingly throughout Kansas, from east to west, along the Arkansas River. Prof. Snow takes it at Lawrence at the arc lights, and it is taken in Topeka in the same way. It also occurs at Manhattan, and I found a single specimen August 16th on a sand bar near Dodge City.

C. cicumpicta, Laf., I first met with in Kansas on a salt marsh near Fredonia in June. This saline deposit is in South-east Kansas, and marks the south-east limits of this species in the United States. I have since taken it in numbers on saline deposits in Cloud, Mitchell, Republic, Stafford and Kiowa Counties, from June to August. It is more common around the edges of saline deposits, where there is some vegetation for shelter. During the hottest parts of the day, and also on

cool days, this species will congregate under cow chips and other places of shelter. The colours vary, more commonly bronze, frequently green, and less frequently blue ; the elytral markings are also variable.

C. togata, Laf., occurs with the above species in all localities except on the salt marshes in Kansas, near Fredonia. It continues a little later in the season than *circumpicta* and is more difficult to capture, and it is also more commonly found on the bare open saline soil. Both the above species have long legs, are swift runners and quick fliers ; the flight of *circumpicta* being more sustained than that of *togata*. The *togatas* taken near Kackley, in Republic County, have recently been described by Dr. W. Horn, of Berlin, Germany, under the varietal name of *Apicalis*.

The following is a translation of Dr. Walther Horn's description :

"*Cicindela togata*, Laf., var. *apicalis*, differs from the type by its greater size, more robust form, eyes less prominent, head and thorax very often much thicker ; each apex of the elytra in the female much less rounded (the sutural spine a little retracted), in the male more acuminate ; sculpture denser, the punctures sometimes here and there confluent ; the markings brownish yellow and narrower. Length, 11¼–12½ mm."

"This form (var. *apicalis)* of *C. togata* is specially remarkable from the striking shape of the apex of the wing-cases. The row of fossulæ along the suture is much less prominent. The sculpturing of the wing-cases is distinctly more dense, the punctures are sometimes to a considerable degree confluent (they remain always more distant from each other at the very base and at the apex). The differences in the width of the prothorax are specially great in the ♂ specimen."

"Though the specimens before me show no variation at all considerable in the shape of the apex of the wing-cases, I have, nevertheless, decided to describe them only as a race of *C. togata*, as this character is very little constant in the whole genus *Cicindela*. Twenty years ago my illustrious colleague, Dr. George Horn, tried to separate as species the three forms, *cuprascens*, *macra*, *puritana*, using much slighter variations of the same character. I cannot, however, agree in this view. The differences stated are most variable, as well as the sculpturing of the wing-cases, the pattern, etc. The lateral emargination before the apex of the ♀ of *C. puritana* is sometimes less sharp than in *C. macra*, and the latter has often its apex (♀) quite as much truncated. Besides, *C. cuprascens* is far less constant. Especially in the ♂, transitions are frequent. I can therefore hold *C. puritana*, Horn,

and *macra*, Lec., as being only varieties (races) of *C. cuprascens*."—(Entomologische Nachrichten, Berlin, Jahrgang xxiii. (1897), No. 2, Seite 17–20.)

Kansas has two remarkable collecting localities for Cicindelidæ: the salt flat near Kackley, and the sand hills south-west of Medora, in Reno County. At the former locality, from July 1st to the 15th, can be found *Tetracha virginica*, *Cicindela fulgida*, *punctulata*, *sperata* var., *circumpicta* and *togata*. At the latter locality, from May 1st to June 1st, occur *Cicindela scutellaris*, *Lecontei*, *splendida*, *formosa*, *venusta*, *vulgaris*, *repanda*, *hirticollis* and *punctulata*.

To the thirty species and varieties herein enumerated as occurring in Kansas, other species will from time to time be added, as collectors more thoroughly explore Western Kansas.

CYANIRIS PSEUDARGIOLUS, BOISDUVAL AND LECONTE.

BY H. J. ELWES, F. R. S., COLESBORNE, CHELTENHAM, ENGLAND.

Mr. Butler's proposal to alter the well-known and universally accepted name of this species to *C. ladon* is one against which I must enter my strongest protest. Whatever species Cramer's figure may have been intended to represent, it certainly, in my copy, is not in the least like *pseudargiolus*, and even if it were like it, it is impossible now to say what *C. ladon* was. I will go further and say that even if it were possible now to prove that *C. ladon* was the same as *pseudargiolus*, the attempt to enforce the strict rule of priority in such a case as this would be contrary to good sense, and detrimental to the uniformity of nomenclature to which we hope some day to attain. Entomologists as well as botanists are now beginning to realize the impossibility of adapting the old rules of nomenclature to cases like this; and though I have little fear that any one is likely to follow Mr. Butler, yet it is just as well to let American Entomologists know that his dictum carries no authority in Europe. *Pseudargiolus* is certainly a much more appropriate name than *ladon*, because it indicates the near affinity of the American species to *C. argiolus*, Linn.

We deeply regret to learn that the Rev. Dr. Fyles, South Quebec, President of the Entomological Society of Ontario, met with a very painful accident a few weeks ago. He slipped upon a snow-covered board, and falling dislocated his ankle and fractured the socket. He has been confined to his bed ever since. His numerous friends unite in sympathy for him and in the earnest hope that he may speedily recover his health and strength.

LIFE-HISTORY OF MARGARODES FLEGIA, CR.

BY HARRISON G. DYAR, WASHINGTON, D. C.

This West Indian Pyralid occurred to me on the cemetery grounds in Key West, Florida. The larva was destructive to a large bush (*Thevetia neriifolia*), commonly planted there for ornament. The larva webs up a group of the narrow leaves into a tube, and eats the parenchyma from within, thus destroying much foliage and rendering the plants unsightly. The proper name of the species appears to be :

PAROTIS FLEGIA, Cram.

1775—*Phalæna-Pyralis flegia*, Cramer, Pap. exot. ii., 66 ; pl. 140, f. D.

1832—*Phalæna-Pyralis flegia*, Poey, Cent. Ins., Cuba.

1827—*Margaronia virginalis*, Hübn., Verz. bek. Schmett., 358.

1854—*Margarodes flegyalis*, Guén., Delt & Pyral., 310.

1854—*Margarodes phantasmalis*, Guén., Delt & Pyral., 310.

1854—*Paradosis villosalis*, Zeller, Lep. Caffr., 58.

1859—*Margaronia flegyalis*, Walker, Cat. Brit. Mus., xviii., 520.

1898—*Glyphodes flegia*, Hampson, Proc. Zool. Soc., London, 732.

Eggs.—Not observed, but probably laid in a mass, as the young larvæ are gregarious.

Stage I.—In a slight web on the back of a leaf, many together. Head about .3 mm., very pale brownish. Body translucent, green, the food showing green, the tubercles dusky, shining ; i. to v. present, no subprimaries ; on the thorax ia + ib, iia + iib, iv. single, anterior ; cervical shield with six setæ, prespiracular tubercle with two. There is a faint trace of an orange-coloured subdorsal line.

Stage II.—Head about .6 mm., pale brown. Body transparent green, with large black tubercles, the subprimary ones now present. Body slender, shining, the tracheal line visible and a trace of the broad orange subdorsal band, seen only with a lens near the extremities at first, later distinct but broken.

Stage III.—Head about .9 mm. Like the mature larva, pale blue, though looking of a dirty green from the food showing through the transparent skin.

Stage IV.—Head 1.4 mm. The same.

Stage V.—(Interpolated.) Head pale brownish, shining ; primary setæ present ; width 1.7 mm. Body subtranslucent pale blue, shining, a broad, deep orange stripe between tubercles ii. and iii., absent on joints 2

and 14, and broken into spots on joints 3 and 4. Tubercles very large, shining black; cervical shield divided into three warts on each side, the anterior bearing one seta, the posterior two, and the lower three: prespiracular tubercle with two setæ; subventral tubercle with one seta: on the other thoracic segments ia + ib, iia + iib, iii. separate, posterior, iv. + v., vi. with one seta; on the abdomen i. and ii. nearly in line antero-posteriorly, iv. + v. below the spiracle, iii. and vi. single haired, vii. a small wart with three hairs on the anterior side of the leg base. Thoracic feet black; abdominal ones slender, blue.

Stage VI.—Head pale brownish, orange tinted; width 2.15 mm. Otherwise no change.

Cocoon and pupa in a similar tube of leaves to that which the larva inhabits. Probably breeds continually. Imagoes emerged Feb. 6th.

OBITUARY.

On the 24th of February died Dr. O. Hofmann, a physician in the Bavarian State service, a well-known Lepidopterist and esteemed writer, in Regensburg, Bavaria. The deceased belonged to a family of entomologists. His brother, the late Dr. Ernest Hofmann, was the author of two illustrated volumes on the European Macrolepidoptera and their larvæ, which have already passed through three editions. Dr. O. Hofmann published a number of papers on the Tineides, and these results of his biological studies are held in great esteem. As a young man he came into contact with Herrich-Schaeffer, of whom he remained an admirer and could relate many anecdotes. Dr. Hofmann paid much attention to American publications. The observations of Dr. Dyar on the larval tubercles were familiar to him, and he had tried to test them on the European Pterophoridæ, a group upon which he had published and with the transformations of which he was remarkably familiar. His death leaves a gap which is felt by earnest students in Europe. His last paper, on the Micropterygides, was read by him last autumn at the Munich meeting of the German Association, and is, I believe, not yet published. One of the kindliest in the short list of my constant correspondents has passed away, whom I shall always miss, but whose future memory in the science may be always assured through his few but excellent contributions to our knowledge.

A. Radcliffe Grote, Hildesheim, Germany.

NOTES ON A FEW BUTTERFLIES FROM THE YUKON.

Last April I received from Mr. Lachlan Gibb a small cardboard box containing a few specimens of Lepidoptera in a very fragmentary condition, which had been sent to him from Dawson, in the Yukon district.

The most interesting species in the collection is *Papilio Machaon*, var. *Aliaska*, Scud., of which there were three specimens.

The other species are :

Papilio Turnus, L., four specimens hardly differing from those found in this latitude, but perhaps a trifle smaller.

Pieris Napi, var. *Venosa*, Scud., three specimens.

Anthocharis Ausonides, Bdv., one specimen.

Argynnis Freija, Thunb., one specimen.

Argynnis Frigga, var. *Saga*, Kaden, one specimen.

The only moth in the collection was *Phragmatobia Rubricosa*, Harr., one specimen.

These are the only species which were determinable. The *Anthocharis* agreed with specimens received by me under the name of *Creusa*, but, to be sure, I sent it to Mr. Wm. Beutenmuller, who wrote to me that it was *Ausonides*. HENRY H. LYMAN, Montreal.

HYDRŒCIA STRAMENTOSA, GUEN.

In response to Mr. Moffat's interesting paper, I would state, since my name is mentioned, that I recollect determining *H. stramentosa*, though rarely, and, I think, for Canadian collectors. The specimen in my collection, now in the British Museum, came, I believe, from Canada. I never remember receiving the species from the West, or regarding it as a specifically Western insect. All the specimens I ever saw of it (they were very few) were from the East. The name is, probably, in Canadian collections on my authority. A. RADCLIFFE GROTE.

BOOK NOTICES.

THE ENTOMOLOGISTS' DIRECTORY.—This very useful publication has been prepared by Dr. Henry Skinner, Secretary of the American Entomological Society, Philadelphia. It contains an alphabetical list of over 1,200 names of persons interested in this department of natural science in the United States and Canada, and gives their addresses, departments of study, whether they have a collection or not, and are willing to exchange specimens ; the names are also arranged geographically under the post-

office addresses in each State. This is followed by a list of Societies, Agricultural Colleges and Experiment Stations; an account of the Entomological organizations at Philadelphia, and a list of Entomological publications. Every one who wishes to exchange his duplicates for specimens from distant localities should obtain a copy of this Directory. It can be obtained from E. T. Cresson, Box 248, Philadelphia, Pa. (Price 50 cents.)

TYPES OF LEPIDOPTERA.—Dr. Herman Strecker has now published the third part of the supplement to his "Lepidoptera, Rhopaloceres and Heteroceres, indigenous and exotic." It contains a list of all the types of species that are contained in his extensive collection, with bibliographical and geographical references. No-less than 425 species and varieties are included in the list, an immense number for a private collection, and descriptions are given of a number of new species. It is a matter of great importance to students to know where the types of described species may be seen; Dr. Strecker has therefore done a good work in publishing this list. In an interesting preface he gives some account of the principal sources from which he has built up his remarkable collection during the last fifty years and the difficulties under which he laboured in early days. These supplements may be obtained from the author, P. O. Box 311, Reading, Penna. (Price 25 cents each.)

MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The regular monthly meeting of the Montreal Branch of the Entomological Society of Ontario was held on Tuesday evening, at the residence of the President, Mr. A. F. Winn, 58 Bruce Avenue, Westmount. The chair was occupied by the President, and there was a good attendance of members. The Very Rev. Dean Carmichael and Mr. C. P. Newman were elected members. Mr. Henry H. Lyman, ex-President, in a brief speech, presented Mr. Winn, on behalf of the members, with a handsome mantel clock, with a suitably-engraved plate, as a wedding present, it being the first time in the history of the Branch that a President had been married during his occupancy of the chair.

Mr. Winn, who was taken by surprise, replied on behalf of himself and Mrs. Winn, thanking the members heartily for the present, which he valued very highly. Mr. Lyman then read a paper on Fall Web-worm Moths and allied species.

ERRATUM.—On page 100, sixth line from top, the word "six" has accidentally been omitted before "pairs under metatarsi I."

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AN ENTOMOLOGICAL MUDDLE: A REVIEW.

BY HENRY H. LYMAN, MONTREAL.

I fear that any one reading the various papers which have appeared during the past year on the Cunea–Congrua–Antigone–Textor controversy would not be very greatly impressed with the lucidity of entomologists. This controversy illustrates remarkably well the difficulty of carrying on a discussion about species or forms whose status is disputed without rendering confusion worse confounded, for the simple reason that different persons use the same name in different senses. For instance, when Dr. Fyles writes of cunea, Drury, he does not mean the insect which Drs. Smith and Dyar understand by the same name, the moth which Harris called the many-spotted ermine moth of the South, Phalæna punctatissima, A. & S., but the individual moth which served as Drury's type and which he chooses to believe did not belong to the genus Hyphantria at all, but to have been a Spilosoma, and from this springs much of the misunderstanding which has arisen between these gentlemen.

In such a case as this, one cannot be too careful to assume nothing and to avoid terms which may be misunderstood.

There are several questions in connection with these moths which require elucidation, one of which, and to my mind the most interesting, viz., whether textor, Harris, and punctatissima, A. & S., to use terms of which there can be no doubt, are, as generally believed, merely forms of one species, or, as believed by Harris, distinct species, has been very generally overlooked by these disputants.

In 1773, Drury described his Bombyx cunea in his "Illustrations of Exotic Entomology," while Abbot & Smith illustrated and described their Phalæna punctatissima in 1797. I have never seen the original edition of Drury, but possess the edition edited by Westwood in 1837, and have no reason to think that Drury's description was modified in any way in the editing.

The description is as follows:

"Alis albis, anticis maculis permultis, posticis duabus nigris, abdomine concolori nigro-maculato."

"*Upper Side.*—Antennæ pectinated and black. There is no appearance of any tongue. Head white. Back and abdomen ash colour. Anterior wings white, with a great number of spots, differently shaped, of a sooty black colour. On the external margin are five spots, those nearest the tips being shaped like triangles. Posterior wings white, with a sooty spot on each near the external edge, and a very faint small mark near the exterior angle. *Under Side.*—Legs black. Breast and abdomen ash colour. The wings marked as on the upper side."

"Alar expanse 1 inch 5 lines." "Habitat: New York." The figure shows a moth of about 35½ mm. in alar expanse.

Abbott & Smith described their Phalæna punctatissima as follows:

"Ph. *Bombyx* elinguis, alis deflexis corporeque niveis nigro punctatis, thorace utrinque lunula nigra."

Phalæna cunea, Drury, is cited as a synonym, and then they say:

"Whether this be the *cunea* of Mr. Drury or not, it deserves a more expressive, or, rather, less erroneous, name. The character above given applies to the male only, the female being entirely white."

Westwood, in editing the re-issue of Drury's plates, says of cunea, which he calls a Spilosoma: "There seems little reason for doubting that this is identical with the Phalæna punctatissima of Abbot & Smith, of which the female is entirely white. The name proposed by Drury evidently alludes to the triangular spots on the margin of the anterior wings, and seems quite as expressive as that employed by Sir J. E. Smith, who seems to have treated Drury's work on several occasions as scarcely deserving of notice."

No subsequent writer, so far as I am aware, has questioned the identity of cunea, Drury, and punctatissima, A. & S., except the Rev. Dr. Fyles.

In 1828, Harris described Arctia textor in the 7th Vol. of the *New*

England Farmer, and in 1841 erected the genus Hyphantria for it, also placing in it punctatissima, A. & S.

In 1855, Walker described his Spilosoma congrua as quoted by Dr. Fyles on page 99 of Vol. XXXI., Can. Ent.

In 1856, Fitch described H. punctata in his 3rd Report on the Insects of New York, p. 387.

In Grote & Robinson's list of Bombycidæ of 1868 they listed Spilosoma virginica, congrua, vestalis, and Hyphantria textor, punctata, cunea, with punctatissima as a synonym of cunea. Of S. congrua, these gentlemen wrote in Trans. Amer. Ent. Soc., II., 72 (1868), as follows :

"Spilosoma congrua, Walk., (c) = ♀ Spil. virginica (Fab.), Walk. Specimens a and b appear to belong to a species distinct from S. virginica, which should retain the name proposed by Mr. Walker. Our notes on these two specimens are as follows : 'S. congrua (♂). Primaries white, with sparse brown dots and an S-shaped subterminal brown line, all incomplete. Abdomen entirely white. Faint discal marks on both wings, wanting in the female. Primaries (♀) with but one or two dots, almost immaculate. Secondaries immaculate in either sex. Inwardly the fore coxæ and femora are dark yellow, without the black spot of S. virginica. All the tarsi and fore tibiæ are inwardly brown. The ♂ has faint discal marks on both wings, wanting in ♀. This species seems slighter than S. virginica, and approaches Hyphantria cunea in the markings of the primaries, but is stouter than that species, the palpi and antennæ as in Spilosoma.'"

What these authors meant by an "S-shaped subterminal brown line" I do not know, as I never saw a specimen of antigone so decorated.

But in Grote's Check List of 1882 this species was not included, the Spilosomas named being virginica, vestalis and latipennis, and the Hyphantrias, the same as in the list of 1868, but in a different order, cunea and textor, however, being still recognized as distinct. But a few months after this list appeared, Mr. Grote proclaimed the discovery of S. congrua, Mr. Thaxter having reared it from the larva, and conjectured that it was "very likely" the same as the form which Mr. Strecker had named antigone. (Can. Ent., XV., 9, Jan., 1883.)

In the April, 1889, number of *Entomologica Americana*, Mrs. Slosson described her Spilosoma prima.

In June, 1889, Mr. J. B. Smith published a note on Spilosoma congrua, Walk., in *Ent. Amer.*, V., 119, arguing that Walker's description

of congrua did not fit S. antigone, Strecker, but did fit H. cunea, Drury, presuming the latter to be the same as punctatissima, A. & S., and quoting a note of Mr. A. G. Butler's, written in 1875, to the effect that the only specimens then representing congrua in the British Museum collection were a presumably female specimen of S. virginica, without abdomen, and what he "believed to be" a male "variety" of H. cunea.

With all due respect to these authorities, I do not place any great weight upon conjectures that something is "very likely" the same as something else, or upon a "belief" that one moth is a variety of another, and it is hardly creditable to the custodians of collections in a great national museum which are not open to the public that types can be lost or destroyed.

In 1890, Mr. J. B. Smith again dealt with these forms in his "Preliminary Catalogue of the Arctiidæ of Temperate North America," in the CANADIAN ENTOMOLOGIST, but, through an error of the printer, overlooked by the proofreader, all the names, whether recognized as good species or only as synonyms, were treated alike and stand apparently as species. (CAN. ENT., XXII., 161–165.)

In 1891, Dr. Smith issued his "List of the Lepidoptera of Boreal America," and in it listed the Spilosomas as virginica, prima, vestalis, latipennis and antigone, with congrua ‡, Grote, as a synonym; and under Hyphantria placed cunea, Drury; with punctatissima, S. & A.; punctata, Fitch; congrua, Walk.; textor, Harr.; candida, Walk., and *ab.* pallida, Pack., as synonyms, the last being an aberrant form which Dr. Packard had described in 1864 under the name of Arctia pallida, in his "Synopsis of the Bombycidæ of the United States." (Proc. Ent. Soc. Phil., III., 118.)

This, then, was the condition of affairs when Dr. Fyles obtained the eggs of antigone in June, 1897, and a specimen of a much-spotted moth of the genus Spilosoma in the Gomin Swamp, and at the annual meeting in the following autumn read a paper under the title of "An Arctian—What is it?"

This paper was never published, but in the CANADIAN ENTOMOLOGIST for May, 1899, appeared a paper by the same author, entitled "Observations upon Spilosoma congrua, Walker," in which Dr. Fyles gave an account of his rearing of these larvæ and described the variation among the imagoes and identified them with Walker's species. Of the much-spotted moth taken at the same time as the parent of the larvæ, he said that it "presented the exact appearance of the insect which is figured,

with closed wings, in the original edition of Drury's work and named by him *Bombyx cunea.*"

This, of course, was an error, as Drury's figure has the wings fully expanded both in the original edition and in that edited by Westwood, which was printed from the original plates.

Dr. Fyles's identification of the moths reared by him with the congrua of Walker may be correct, but it would be much more satisfactory if Walker's types were forthcoming; but his treatment of the webworm moths is not satisfactory.

Referring to the many-spotted ermine moth of the South, he says that its most spotted form is supposed to have been the Bombyx cunea of Drury, and that therefore it is said that the name of the variety must take the place of the name given by Harris, and till very lately generally accepted.

Now, the question as to whether the name textor should stand depends upon a number of questions: first, upon whether the immaculate form of the North is, or is not, specifically distinct from the spotted form of the South; and, second, upon whether the authorities are, or are not, correct in identifying it with the budea of Hübner; and Dr. Fyles apparently overlooked the fact that even if cunea, Drury, could be shown not to have been described from a southern webworm, the name punctatissima, A. & S., has priority of textor, if the two forms belong to the same species. Dr. Fyles, comparing the illustration of the webworm moth as figured by Dr. Riley with the figure given by Dr. Bethune in CAN. ENT., V., 141, instead of laying the blame for the absurd size of Riley's figure upon the incorrect drawing by the artist, apparently accused that eminent entomologist of confusing antigone and punctatissima, as he says: "Riley's cut represents an insect 20 lines in expanse of wings (it really shows one nearly 22 lines when measurement is made from centre of thorax to tip of each wing). I venture to say that no fall webworm moth ever attained such a size. But latitude was necessary to take in such moths as *congrua* and *cunea.*" (The latter name apparently used in the Fyles sense, not that of authorities generally.) And a few lines further down, referring to the series of wings shown by Riley, says triumphantly in italics: "*There is not one of them but can be exactly matched from insects I raised, or that were taken with the mother insect in the Gomin.*"

If these sentences do not imply that Dr. Riley confused two or three species of moths, I cannot see that they imply anything.

Following Dr. Fyles's paper, appeared in the June CANADIAN ENTOMOLOGIST a paper by Dr. Dyar in which he admitted that Dr. Fyles was probably right in identifying antigone, Strecker, with congrua, Walker, but he stumbled in regard to Dr. Fyles's meaning about cunea, understanding it as equivalent to punctatissima.

In the July number, Dr. Smith dwelt on the probability of Mr. Walker having before him three banded specimens of punctatissima, and the improbability of his having three banded antigone from Georgia, and these arguments are of considerable weight, though naturally not conclusive, and, indeed, not intended to be so by the author.

To the September number, Mr. Grote contributed a page on this controversy, without adding any information of value, but showing that he has apparently forgotten that there were two species under the name congrua in 1867, the third specimen (c) being S. virginica ♀ according to G. & R.

In the December number there were no less than two papers upon this controversy. The first, by Dr. Ottolengui, affords some interesting information in regard to the distribution of S. antigone and also as to much-spotted specimens of punctatissima occurring in the spring brood in the South, but it would appear that he also stumbled in regard to supposing that Dr. Fyles meant punctatissima by the name cunea.

Dr. Ottolengui's theory in regard to the type of pattern in all species is ingenious and there may be some truth in it, but his illustration of it in the case of antigone is of no weight at all, as the dot or spot "at the second fork of the median nerve" as described by Dr. Fyles is not confined to S. antigone, but also occurs in S. virginica, S. vestalis, H. punctatissima, and Leucarctia acrea.

Again, in saying that this spot "is not a constant feature of Prof. Riley's series (Forest Insects, p. 246, fig. 87), if, indeed, it occurs at all exactly as it does in *congrua*," he is laying altogether too much stress on the supposed infallibility of the artist. No artist is infallible, and slight errors can be detected in almost every figure not taken by photography.

As to his aberrant specimens from Summerville, S. C., I sincerely hope he will not erect a new species in so variable a genus on such slender material, as I have a ♂ S. virginica taken *in coitu* with a normal ♀ which varies in a somewhat similar manner, the outer third of costa

and the outer portion of the nervures of the primaries about the apical portion being blackish, which makes it look as if slightly scorched at the tips as described by the Doctor. Dr. Ottolengui expresses his conviction that congrua is distinct from cunea, but this was surely unnecessary, and shows that he misunderstood Dr. Fyles's meaning, as no one has suggested that the ground-feeding S. antigone is identical with the tree-feeding H. punctatissima.

In the same number Dr. Fyles had a second paper upon the same tangled question.

Dr. Fyles derives the name cunea from the Greek κυνέη (a dog's skin), from a supposed fancied resemblance in coloration to the spotted carriage-dog of Europe, but I think Mr. Westwood's derivation from the Latin cuneus (a wedge) quite as probable, Drury having especially referred to the triangular marks. Dr. Fyles draws attention to the fact that the hind tibiæ are not shown in Drury's figure, and that Walker did not describe the hind tibiæ of what he supposed to be cunea or of what he described as congrua, but these points are of very minor importance, especially as in Drury's day entomological artists were not so particular about a spine or so, more or less, on the legs of insects.

Dr. Fyles says, in regard to cunea, that "we have nothing to guide us except Drury's figure, and Walker's description."

This is a very extraordinary statement, as we have Drury's description as well as figure; but how Walker's description of a few specimens of moths which he supposed to be identical with Drury's cunea could have any weight in deciding what Drury's moth really was, I fail to see.

Dr. Fyles, however, does not lay much stress on Walker's description of *supposed* cunea, but falls back on Drury's figure and finds it sufficient. I am not at all surprised at that, as I think that practically everybody else finds it sufficient also, as I believe that until Dr. Fyles became guilty of his present heresy, the belief that Drury's figure of cunea represented the much-spotted ermine moth of the South was one of those doctrines to which the formula "semper, ubique et ab omnibus" could be applied.

Dr. Fyles lays great stress on the fact that not one of the eight figures given by Riley to illustrate the supposed variation of cunea agrees exactly with Drury's figure, but this is really of no significance, as Riley was not trying to match that figure at all, but merely to show the range of variation, and in the case of so variable a species it might be possible to give a hundred figures and yet not have two exactly alike.

In Dr. Fyles's concluding remarks on congrua, he says :

(c) Dr. Hulst and others have bred it.

(d) S. antigone has been found to be identical with it.

These statements are too positive to be scientific. Dr. Hulst and others have bred antigone, and it seems probable that that species is the same as congrua, but that is all we can say at present.

In the January number of the present year Dr. Dyar very briefly points out Dr. Fyles's error, calling attention to the fact that of cunea the abdomen is described as "concolori nigro-maculato," the English description saying "back and abdomen ash colour." Drury's figure shows a white abdomen, while the abdomen of Dr. Fyles's specimen is yellow. Dr. Dyar pronounces this much-spotted Spilosoma to be prima, Slosson, and Mr. Beutenmuller thought last June that Mr. Winn's specimen of the same species which I showed him was possibly that species, but if so, either Mrs. Slosson's types must have been aberrant or she laid too much stress on the "cream-colour, almost buff" tone of the moth, as in these specimens the only yellowish tone is on the nervures.

I entirely disagree with Dr. Fyles, as I can see no resemblance, beyond the most superficial, between his specimen and Drury's figure, while I have a specimen of H. punctatissima from New Jersey which is practically identical with the figure of cunea.

I am, as mentioned by Dr. Dyar, at work upon the question of the relationship existing between punctatissima and textor, but am not in a position to make any report as yet.

NOTE.—Since writing the above, Dr. Fyles has published another paper upon this matter in the March number of the CANADIAN ENTOMOLOGIST, and in this has made plain what had better have been pointed out at first, that by cunea he merely referred to Drury's type and not to the species which has since been known by that name, but he falls into other errors.

He is wrong in implying that Dr. Ottolengui doubted the identity of cunea, Drury, and punctatissima, A. & S.

What Dr. Ottolengui expressed a doubt about was whether textor, Harris, and punctatissima, A. & S., were the same.

Abbot's figures of punctatissima ♂ and ♀ are admirable. What does Dr. Fyles mean by "an irregularly spotted insect?" The figure shows perfect bilateral symmetry. The figure of the larva is poor, but no worse than hundreds of other figures which have been made of larvæ.

Dr. Fyles calls Abbot's plate "quite a fancy sketch!"—presumably because the larva is represented as feeding on the mulberry, but I have no doubt it does, it is such a general feeder,—almost universal, Dr. Howard says.

Dr. Fyles's reference to Walker's description of what he took to be cunea, and what was doubtless punctatissima, is without weight, as I have mentioned above.

Drury only figured and described the ♂ of cunea.

Dr. Fyles seems to measure the expanse of moths from tip to tip as set according to the present fashion. This is misleading, and the measurement should be taken from the tip of wing to centre of thorax and doubled.

Dr. Fyles certainly sticks to his guns with a tenacity not surpassed by the Boers in the Transvaal, and asserts that even if his Gomin specimen is prima, Slosson, it only proves that the latter is a synonym of cunea, Drury!

Dr. Fyles sums up the matter by stating that he is convinced that Hyphantria textor, Harris, is not one and the same with Bombyx cunea, Drury, and in this I am inclined to agree with him, but surely such a statement was unnecessary after declaring Bombyx cunea, Drury, to be a Spilosoma.

FOUR NEW COCCIDÆ FROM ARIZONA.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Dactylopius Irishi, sp. n.

♀.—Adult dark red, forming a very convex chalk-white ovisac about 3 millim. long and 2½ high, the sacs clustered on the twigs of the plant at the nodes, from two to ten at a node. Eggs and newly-hatched larvæ pale yellow.

Adult ♀, after being boiled and flattened on a slide, nearly circular, about 2 mm. long. The insects do not stain the liquor potassæ on boiling, but the body contains a dull crimson pigment, partly retained in boiled specimens.

Skin with many small round glands, which in lateral view look like truncate spines. Dermal hairs very few and small. No lateral patches of spines. Caudal lobes completely obsolete, marked only by a pair of short stout spines on each side. Hairs on anal ring comparatively short

and inconspicuous, much shorter than in *D. Townsendi*. Legs and antennæ pale yellowish.

Middle leg measuring about as follows in μ: Coxa, 111; femur with trochanter, 231; tibia, 180; tarsus, 90; claw, 30; width of femur, 57. Antennæ 8-jointed, the joints measuring in μ: (1.) 45–51, (2.) 36–40, (3.) 33–42, (4.) 18–27, (5.) 25–27, (6.) 16–24, (7.) 27, (8.) 69–78. Formula varying from 8132(47)56 to 8123(57)46.

Hab.—Tempe, Arizona: Numerous on the butte, on *Larrea tridentata*, Oct. 28, 1899. *(Ckll.)* This interesting species is named after Mr. Fred. M. Irish, of the Arizona Normal School, who was with me at the time of its discovery. *D. Irishi* is closely related to *D. Steeli*, which infests the same plant in New Mexico, but it is readily distinguished by its much more convex ovisac, and its habit of clustering on the twigs at the nodes, instead of living on the leaves. In the latter respect the insect resembles *D. prosopidis*. In the most advanced state the ♀ is very nearly, but not entirely, covered by the ovisac.

Aspidiotus (Hemiberlesia) candidulus, sp. n.

♀.—Differs thus from *A. lataniæ*: Anal orifice smaller, about as big as one of the median lobes; width of anal orifice about 12 μ; median lobes not or barely notched; nine squames, close together and little branched, on each side of the median lobes; inner chitinous processes of interlobular intervals conspicuously larger than the outer; spines (hairs) long, even exceeding the squames; four groups of circumgenital glands, posterior laterals 4 to 5, anterior laterals 4; margin of insect with very long bristles at distant intervals; embryos in ♀ very large, about 210 μ long; median lobes of embryo twice notched on outer side.

♀.—Scale white with a yellowish tinge, only slightly convex, exuviæ sublateral, varying from pale straw-colour to ferruginous brown. ♂ scale elongate-oval, white, with the pale straw-coloured exposed exuvia near one end.

Hab.—Tucson, Arizona, just behind the University; locally abundant on leaves and twigs of *Prosopis velutina*, along with plenty of *Xerophilaspis prosopidis*. Collected in November, 1899, by the writer, in company with Prof. Toumey. The ♂ scales are much more abundant than the ♀; when originally describing *X. prosopidis* (Suppt. to Psyche, Dec., 1895) I had some of these ♂ scales, and regarded them as belonging to the *Xerophilaspis*.

Xerophilaspis Parkinsoniæ, sp. n.

♀.—Scale small, about 1 millim. diam.; exuviæ large, dark brown to black; first skin large, placed on second; second more or less covered by a white film; scale suboval, white, thin; the part of the scale beyond the exuviæ is anteriorly much less than the diameter of the latter, posteriorly somewhat greater, the exuviæ being excentric.

♂.—Scale oval, white; exuvia towards one end, brown, with a pale median line.

♀.—(Mounted on slide) About 700 μ long; spines moderately large; squames scarcely visible; caudal end striated; no circumgenital glands; anal orifice long and narrow, about 10 μ long and 39 μ from base of median lobes; median lobes rather large, about 12 μ long, close together but not contiguous, broad, rounded at ends, with a deep square notch on the outer side; second lobes smaller, separated from the first by a fair interval, pointed, notched on the outer side; third lobes rudimentary; dorsal glands few; interlobular chitinous processes present, but very small: they are beneath the lobes rather than between them; a submarginal row of elongate glands, such as are seen in *Chionaspis*; anterior part of insect brown even after prolonged boiling; antennæ represented by large low-conical protuberances; embryo in ♀ very large, about 186 μ long, with dark eyes.

Hab.—Phœnix, Arizona, Oct. 23, 1899; on twigs and branches of *Parkinsonia torreyana*. The *Parkinsonia*, or "palo verde," is common around Phœnix, and I expected to find a coccid peculiar to it, but for many days my search was fruitless. At last I saw, one day, a tree with the branches on one side turned yellow, and on going up to it, found the above-described insect in great numbers. With the scales I found a small form of *Chilocorus cacti* predaceous upon them. *X. Parkinsoniæ* is not a true *Xerophilaspis*, nor yet a satisfactory *Targionia*. It differs from typical *Xerophilaspis* in the development of the white scale, and the position of the anal orifice; but it agrees sufficiently in the form of the exuviæ, the large embryo, etc.

Diaspis Arizonicus, sp. n.

♀.—Scale, dull white, more or less circular, but very irregular because crowded into the cracks in the bark; a thick ventral scale; exuviæ very inconspicuous, yellowish-white, or first skin sometimes brown; first skin with its anterior end extending beyond margin of second.

♂. Scale flat, firm (not at all woolly), dull white, parallel-sided, about ¾ mm. long and not quite half as wide.

♀.—Adult dark brown even after boiling in liquor potassæ, strongly chitinized, spiracles large and conspicuous; segmentation visible; caudal area brown and chitinized, except its basal portion, anterior to the anal orifice, which is transparent and colourless. The non-chitinized area at the base of the caudal plate permits the latter to be withdrawn almost wholly into the body, leaving the tip only protruding. No circumgenital glands. Caudal area very much wrinkled, with many round to oval dorsal glands, arranged more or less in transverse rows, and also rather numerous scattered small ventral glands. Anal orifice rather small, a long distance from hind end. Caudal margin strongly crenate; three larger protuberances, more or less emarginate at the ends, may be taken to represent the lobes; between the median lobes, instead of two squames, are two lobules; between the first and second lobes are two or three lobules; between the second and third are three to five lobules. No squames, but laterad of each lobe is a very long spine; two spines laterad of the median lobes.

♀.—Second stage not so chitinous, transparent after boiling; mouth-parts far posterior; antennæ represented by very large subconical protuberances.

Hab.—On trunks and branches of *Prosopis velutina*, Wooton, near Kellner's Ranch, several miles west of Phœnix, Arizona; Oct. 11, 1899. *(Ckll.)* *Xerophilaspis prosopidis* occurred on the same trees at the same place.

D. Arizonicus is remote enough from typical *Diaspis*, but by reason of the median interlobular structure, and the arrangement of the dorsal glands, it approaches nearer to the subg. *Epidiaspis* (type *D. piricola*). It is probable that it will later be made the type of a new subgenus.

A SALE OF BUTTERFLIES.

Entomologists went from all parts of the country when the celebrated collection of butterflies and moths made by the late Samuel Stevens, F.L.S., F.E.S., was sold. Mr. Stevens had continued his work of collecting, breeding, and buying for 60 years, and many specimens were already historic, having come from other noted collections. The "large copper" butterfly, long since become extinct, always attracts bidders, but £8 given for an exceptionally fine male creates a record, and even for one of the females £6 5s. was bid. A specimen of the common "painted lady" also fetched £8, while another of the same species cost its buyer £6 10s. A handsome "red admiral," which is perhaps nearly as often seen as the "small tortoiseshell," was sold for £5 10s., while a "peacock" with 20 "eyes" on its wings went for £5.—*London, England, Globe* (March 29, 1900).

HYDRŒCIA STRAMENTOSA.

SIR,—I am in receipt of a communication from A. Radcliffe Grote, M. A., Hildesheim, Germany, anent the determination of *Hydræcia stramentosa* for Canadian collectors. He points out to me that the fact of its being under *Apamea* in our list indicates the source from whence the name was obtained, as he was the only author that ever used that generic term for the group to which *stramentosa* belongs, proving that he knew of its being taken in Canada, having received specimens from collectors there to name; which is more than likely, as Mr. Grote was at that time the recognized authority on North American *Noctuidæ*.

The original Canadian collection was brought together from various sources to be exhibited at the "Centennial" in Philadelphia, 1876. Some material for it came from the Province of Quebec, which would be largely from Montreal collectors; and this collection was reviewed by Mr. Grote before it was dispatched on its mission. From exposure at Philadelphia and the Colonial and Indian Exhibition in London, England, 1886, what was left of it had mostly become worthless for comparison, and it was necessary to replace it as far as possible with fresh specimens. There is no evidence that there ever had been a specimen of Stramentosa in the original collection; if there was, it must have been returned to its owner. Other specimens, bleached beyond recognition, are yet in the collection—from want of fresh material to replace them; so I reason, that if there had been a specimen of *stramentosa* left in the collection, it would be there still. If such an one is extant, it will likely be found in some Montreal collection.

I have often thought when doubts were expressed about the correct determination of some specimen, that a label with the name of the determinator was of the very first importance to indicate in some measure its reliability. My Hamilton collection was largely determined for me by Mr. Grote, then living in Buffalo, and as I kept his lists for future reference, when doubt arose I could turn them up and feel that these particular specimens at least were correct beyond question. But time and *Anthrenus* worked havoc with some of the original specimens, which reduced the value of the lists, as the specimens replacing them were only my estimate of what were the same.

J. ALSTON MOFFAT,
Curator Ent. Soc. of Ont.

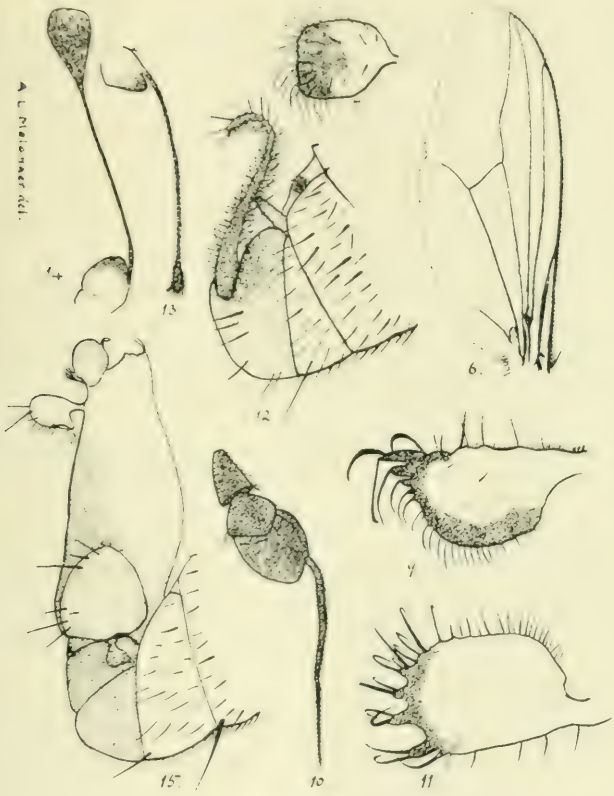
A DECADE OF DOLICHOPODIDÆ.*

BY AXEL LEONARD MELANDER, AUSTIN, TEXAS.

The ten species included in the present paper are all from the collection of Dr. Wm. M. Wheeler, under whose management this work was performed. As a slight token of my appreciation of his generosity and kindness, it pleases me greatly to dedicate one of the forms to him.

FIG. 2.

*Contributions from the Zoological Laboratory of the University of Texas, No. 2.



Figs. 9–15.

EXPLANATION OF FIGURES 9 AND 10.

1. Hercostomus vetitus, male wing.
2. Hercostomus vetitus, lamella of hypopygium.
3. Hercostomus anarmostus, male wing.
4. Paraclius hybridus, hypopygium.
5. Paraclius hybridus, male wing.
6. Tachytrechus protervus, female wing.
7. Tachytrechus protervus, lamella.
8. Tachytrechus volitans, hypopygium.
9. Dolichopus sincerus, lamella.
10. Dolichopus sincerus, male antenna, from inside.
11. Dolichopus misellus, lamella.
12. Nematoproctus venustus, hypopygium.
13. Gymnopternus mirificus, male antenna.
14. Gymnopternus phyllophorus, Lw., male antenna.
15. Pelastoneurus Wheelerii, hypopygium.

1. *Dolichopus sincerus*, n. sp. (Figs. 9, 10.)

Legs, except all the coxæ, hind tarsi and tip of hind tibiæ, yellow; cilia of inferior orbit black; fourth longitudinal not broken, but bent; antennæ black; legs plain; wings unspotted.

Male.—Length 4.5 mm., of wing 4 mm. Bright brassy-green. Face narrow, silvery-dusted, with a slight yellowish tinge on upper part, under the antennæ a little darkened. Palpi dark, silvery-dusted. Antennæ wholly black, third joint broadly ovate; arista a little longer than antenna, stout, tapering, not evidently pubescent. Vertex shining brassy-green, not dusted. Infra-ocular cilia pale yellow, not strong. Thoracic dorsum bright brassy-green, more cupreous along sides and with two cupreous stripes in front bounding the rather strong acrostichals. The velvety and the silvery spots present near base of wing. Abdomen shining, green, becoming more cupreous, then piceous towards incisures. Hypopygium with the lamellæ moderate in size, the lamellæ sub-triangular, whitish with wide black border and ordinary fringe of hairs. Pleura greenish, glaucous, and in various places with a cupreous reflection. Coxæ concolorous with the pleura, except at very tips; fore coxæ with black hairs and bristles on anterior surface: middle coxæ with white hairs intermixed with the black. Femora reddish yellow, slightly darker on upper surface, especially on hind femora toward tip; posterior four with a single preapical bristle; hind femora not ciliated beneath, although the small hairs are a trifle longer than usual; tibiæ yellow, except outer sixth of hind ones, where the black encloses a "dimple" on the outer side; tarsi plain, anterior four from tip of first joint and whole of hind tarsi black; pulvilli pale yellow, small. Wings grayish-hyaline, broad; costa elongate, thickened at tip of first vein; fourth vein with usual flexure; posterior cross-vein perpendicular to first segment of fifth vein and distant about three times its own length from tip of fifth; hind margin with rather evident fringing. Tegulæ and halteres yellow; tegular cilia black.

One male, collected by Dr. Wm. M. Wheeler, in Price County, Wisconsin, August 19, 1897.

Differs from *præustus* by the face being more silvery, vertex shining, fore femora not darker beneath, wings not blackened at tip, and the fourth longitudinal distinctly bent.

2. *Dolichopus misellus*, n. sp. (Fig. 11.)

Femora yellow, hind ones not ciliated; cilia of inferior orbit pale;

cilia of tegulæ black ; wings unspotted, fourth longitudinal not broken ; hind tibiæ tipped with brown ; antennæ black, red below on first joint ; fore coxæ reddish in front ; fore legs plain ; vertex violet-bronzed.

Male.—Length 5 mm., length of wing 4.5 mm. Face and palpi yellowish white. Antennæ lengthened, the joints subequal in length, black ; first joint reddish below, third with the arista preapical, a little longer than antennæ. Vertex violaceous with a cupreous tinge. Infra-ocular cilia pale yellow. Dorsum of thorax and scutellum bronzed-green, shining, not dusted. Abdomen strongly compressed, bronzed-green, shining, slightly dusted, incisures not well marked. Hypopygium not large, lamellæ rounded apically, yellowish-tinged, narrowly black-bordered, and fringed. Pleura dark green, dusted, yet shining in places ; the place of the usual velvety-black antealar spot is taken by a Y-shaped cupreous groove. Bases of middle and hind coxæ and posterior face of front coxæ piceous, glaucous ; the anterior face of the front coxæ is dark yellow, sharply limited, without the usual coating of black hairs, but with three of the strong apical ones and a few pale hairs. Femora yellow, the hind ones not ciliated and with a single anteapical bristle ; tibiæ yellow, except the hind ones at tip on inner side, an elongate apical "dimple" and a narrow glabrous streak on the posterior face of hind tibiæ, the dimple nearer the outside ; tarsi plain, blackened from tip of first joint (hind ones missing in male) ; pulvilli whitish. Wings grayish-hyaline ; veins not black ; fourth vein obtusely, but sharply, bent ; posterior cross-vein distant less than twice its length from tip of fifth ; costa with a small, lengthened, node-like swelling beyond junction with first vein. Tegulæ and halteres light yellow, the former with very long black cilia.

The female differs from the male by the broader, grayer face ; greener front ; shorter tegular cilia ; no costal node nor impression in hind tibia ; front face of fore coxæ with black hairs. Hind metatarsus with basal two-thirds yellowish.

One male and one female from Natrona Co., August 31, 1895, and one female from Little Wind River, September 2, 1895, Wyoming ; collected by Dr. Wm. M. Wheeler.

From the only species with which this could be confounded in any way (*setosus*, *platyprosopus*, *præustus*, *fulvipes* and *Coquilletti*) this species may be readily distinguished by the first short diagnosis.

3. *Gymnopternus mirificus*, n. sp. (Fig. 13.)

Very similar to *G. phyllophorus*, Loew, from which it differs by the

following characters only: Face less ochraceous, more gray; third joint of antennæ more oval, its arista slightly pubescent, terminating in a very small lamella; the hypopygium is scarcely a third the length of that of *phyllophorus*, though this is due in part to shrinking.

One male specimen; collected by Dr. Garry de N. Hough in Massachusetts.

Hercostomus has always been an incongruous genus, formed of species rejected from several genera. The next two species differ from all the genera of *Dolichopodida* as now understood, but as they show evident affinity to the species of *Hercostomus*, they may be placed, at least provisionally, in that genus. The structure of the male hypopygium, the curvature in the third vein and the presence of oral bristles show a departure, more or less marked, from *Gymnopternus*. The following key is wholly artificial, but readily separates the species hitherto included in this much-abused genus:

Legs largely yellow ..... 2.
Legs largely black ..... 5.
2. Post-ocular cilia black ..... 3.
Post-ocular cilia pale ..... 4.
3. Face ochraceous ..... *procerus*, Wheeler.
Face dark ..... *vetitus*, n. sp.
4. Antennæ yellow ..... *latipes*, Aldrich.
Antennæ black ..... *impudicus*, Wheeler.
5. Legs and lamellæ piceous ..... *unicolor*, Loew.
(Synonym *Gymnopternus pœnitens*, Wheeler.)
Legs and lamellæ fuscous ..... *anarmostus*, n. sp.

4. *Hercostomus vetitus*, n. sp. (Fig. 1, 2.)

Male.—Length 4.5 mm., of wing 4.5 mm. Face of moderate width, brownish. Palpi piceous, proboscis fuscous, surrounded with a fringe of bristles. Antennæ short, black, second and third joints together rounded obtusely pointed at tip, with a dorsal, short, gradually tapering, pubescent arista. Vertex dark greenish. Post-ocular cilia black; post-oral beard wanting. Dorsum of thorax dark blue-green, more shining posteriorly, scutellum blue green, with surface hairy. Abdomen shining, dark blue-green, becoming slightly cupreous towards apex, incisures not darkened. Hypopygium large, sessile, piceous, slightly pubescent dorsally, the dorsal cardiform plate bristly; internal appendages reddish; lamellæ fuscous,

darker towards tip, slender, not lamelliform, fringed with black hairs outwardly and at apex, at basal third a sudden swelling, then of regular width to the triangular clavate apex. Venter concolorous with the rest of the abdomen. Pleura piceous, glaucous. Coxæ more or less darkened, except at tips; fore coxæ less blackened on anterior and posterior surfaces, with short, black hairs besides the long apical bristles; middle coxæ with usual apical brush of hairs. Legs yellow, slightly infuscated towards tip of tarsi; first joint of fore tarsi in length equal to the three following together, of the middle tarsi the first joint equals the next two and half of the third following joints, the hind metatarsus is shorter than the joint next following; posterior femora with a single apical bristle. Wings subhyaline, third vein slightly and gradually converging towards the fourth; anal angle rounded; posterior cross-vein perpendicular to proximal segment of the fourth vein. Tegular cilia black, tegulæ and halteres yellow.

One male, from Clementon, N. J.; collected by Mr. C. W. Johnson, May 30, 1897.

5. *Hercostomus anarmostus*, n. sp. (Fig. 3.)

Male.—Length 3.5 mm., length of wing 3.25 mm. Face rather broad, gray-dusted. Palpi and proboscis piceous. Antennæ black, third joint lengthened, flat above, rounded below, rather acutely pointed, bearing the dorsal arista. Vertex dark greenish, opaque. Post-ocular bristles black. No beard present. Thorax shining, dark green, with usual bristles. Scutellum concolorous, sparsely bristly, and with a marginal row of a few short bristles in addition to usual two. Abdomen green, somewhat brassy, incisures not darkened. Hypopygium piceous, pubescent, its cardiform plate bristly; internal appendages lengthened, reddish; penis pointed; lamellæ infuscated, crescent-shaped, much thickened at middle and evenly attenuated to the tip, covered and fringed externally with short black hairs, apex narrowly but distinctly margined with black. Pleura and coxæ, except tips, green, overlaid with glaucous. Front coxæ with black hairs anteriorly; middle coxæ with fewer hairs than usual. Legs infuscated, especially on upper side of all the femora, tip of hind tibiæ, and fore tarsi from tip of first joint; middle tarsi from apex of first joint black. Metatarsus of fore legs a little shorter than three following joints, of middle equal to two following, of hind legs shorter than next joint and with a few short bristles below. Wings subhyaline, slightly tinged with yellow anterior to third vein and bordering each vein;

veins strong, black, a thickening in the first vein where it reaches the costa; third and fourth veins subparallel, the fourth vein ends slightly before the tip; posterior cross-vein bowed outwardly, perpendicular to the last segment of the fourth vein, a slight lobe under the posterior cross-vein; anal angle full, rounded. Halteres and tegulæ yellow; tegular cilia black.

One specimen; Chicago, Illinois, June 10, 1899; collected by Dr. Wm. M. Wheeler.

6. *Pelastoneurus Wheelerii*, n. sp. (Fig. 15.)

Male.—Length 3.75 mm., of wing 3 mm. Face of moderate width, narrowest in middle, green, thickly overlaid with silvery dust, becoming yellow toward antennæ. Proboscis piceous, palpi silvery, with a few hairs. Antennæ wholly reddish-yellow, slightly subfuscated at apex; third joint short, ovate, bluntly pointed, arista short, tapering, with strong plumosity. Vertex largely green, dusted with yellowish-brown, on each side of ocelli a bluish space. Post-ocular cilia black above, white below; a few post oral bristles present. Thoracic dorsum when viewed from the front dusted with yellowish-brown, wholly green except a purplish line on outer side of acrostichals, gradually wider behind, where it covers the dorsum except a pre-scutellar, triangular green spot. Above the base of the wing a ⌣-shaped black velvety spot extends forward, terminating above in a silvery spot visible only from above. Scutellum green, with brownish dust, glabrous. Abdomen green, broadly silvered at sides, toward base of each segment cupreous; incisures blackened; first segment laterally with a strongly-marked marginal row of erect black bristles. Hypopygium subpedunculate, rather slender, dorsal half obliquely marked with green, glaucous, apical half (=remainder) shining, translucent yellow, internal appendages fuscous, enlarged, appearing like a second set of lamellæ; at base of these is a close fringe of yellow bristles; penis not projecting; lamellæ yellow, rather small, bent backward, circular at tip, fringed with light straggling hairs. Pleura concolorous with sides of abdomen. Fore coxæ pale yellow, silvery in front, and with a moderate coating of black hairs; middle and hind coxæ glaucous basally on outer face; middle coxæ with several black bristles anteriorly and hind coxæ with its usual bristle on outer side. Legs wholly yellow except toward tip of tarsi, where infuscation commences; metatarsus of fore legs shorter than three joints following, of middle legs shorter than two following, and of hind legs shorter than next joint; hind femora with a strong bristle on

lower outer surface below the usual preapical one. Wings with typical neuration; the anterior region along the veins with a distinct darkening; posterior cross-vein inclines rather toward outer part of the fourth vein; anal angle full, almost rectangular. Cilia of the yellow tegulæ black. Halteres yellow.

One male taken along the Colorado River, south of Austin, Texas, October 7th, 1899, by Dr. Wm. M. Wheeler.

From allied forms the present species may be readily recognized as follows:

From *cognatus* by the green vertex, violet thorax, and shorter plumosity of the arista.

From *lineatus* it differs in the coloration of the thorax, the subpedunculate hypopygium and the lighter coloured lamellæ.

7. *Paraclius hybridus*, n. sp. (Figs. 4, 5.)

Male.—Length 3.75–4.25 mm., wing 3.5–4 mm. Face and palpi covered with a golden-gray dust, partially shining, face rather broad. Proboscis prominent, piceous, gray-dusted. Antennæ red; third joint slightly longer than broad, bluntly pointed, infuscated, especially towards tip; arista tapering, moderately plumose. Front cupreous, dusted with golden. Post-ocular cilia yellowish below. Dorsum of thorax and scutellum bronzed, opaque-dusted. Immediately above base of wing a black spot extends forward. Abdomen bronzed, somewhat shining, gray-dusted, especially towards sides. Hypopygium subsessile; lamellæ small, triangular, piceous except at base on dorsal side, where pubescence is also lighter. The usual lamellar filament is wholly wanting. Pleura glaucous. Coxæ with black hairs; fore coxæ yellow, except extreme base; middle coxæ glaucous largely, and hind ones less so, on outer side. Legs reddish yellow; tarsi darkened from tip of first joint; hind femora ciliate with short black hairs below. Wings grayish-hyaline; bend of fourth vein less sharply angulate than in *propinquus*. Tegulæ and halteres yellow; halteres with black cilia.

Female.—Length 3.75–4.75 mm., wing 3.25–4.25 mm. Coloration as in male.

Seven males and five females taken at Woods Holl, Mass., July 14th to 27th, 1899, by Dr. Wm. M. Wheeler.

This species was taken in the same netful with another *Paraclius* and a *Pelastoneurus*. The proportions taken were:

	Male.	Female.
Pelastoneurus lamellatus, Loew	15	18
Paraclius hybridus	9	5
Paraclius propinquus, Wheeler	21	13

The intermediate character of the new species seems to indicate a case of hybridism, but the data are not sufficient to bear out this supposition. *Hybridus* shows affinity for *Pelastoneurus* in the trend of the fourth longitudinal vein and in the lack of the filamentous appendages of the hypopygial lamellæ. The other characters are, however, Paraclian. It may be readily recognized by the following combination of characters: Antennæ largely red; base of fore coxæ narrowly dark; front bronzed; lamellæ of hypopygium triangular.

8. *Nematoproctus venustus*, n. sp. (Fig. 12.)

Male.—Length 4.75 mm., wing 4.5 mm. Face narrow, of nearly equal width, reaching three-fourths of the distance from the antennæ to the lower corner of the eye, covered with silvery dust. Palpi small, yellow, inserted at sides of proboscis. Proboscis piceous, sparsely pubescent. Antennæ short, reddish; first joint longest, glabrous; third ovate, short, with dorsal, long, bare arista (pubesence scarcely perceptible under higher power). Front shining green, the white of the face encroaching along the sides above the antennæ. Post-ocular cilia yellow; lower occiput with long yellow hairs. Eyes hairy. Thoracic dorsum and scutellum brilliant green, slightly dusted anteriorly, and with faint indications of median cupreous stripings; above the base of the wing a velvety black spot present, stronger anteriorly. Abdomen hairy, incisures blackened; first segment brassy green, second and third translucent yellow, fourth cupreous becoming green, sixth green; hypopygium small, rounded, piceous, pubescent, terminal, with long, filiform, infuscated, hairy appendages; internal appendages inconspicuous; penis short, perpendicular. Pleura greenish, gray-dusted. Middle and posterior coxæ concolorous with pleura; anterior coxæ yellow. Legs yellow, except posterior tarsi and outer fourth of posterior tibiæ, which are infuscated; pulvilli not conspicuous. Wings clear, broadest about the middle; last segment of fifth vein once and one half the length of the cross-vein; cross-vein oblique; last section of fourth vein converging towards third, then subparallel towards tip, distant from third vein, and terminating at tip of wing. Halteres and tegulæ yellow; tegular cilia long, pale yellow.

One male specimen taken by Mr. C. W. Johnson, at Westville, N. J., June 6.

Though the genus *Nematoproctus* has been abandoned by European dipterologists, it may be reinstated, at least provisionally, for this species whose habitus is different from any North American *Diaphorus* with which genus *Nematoproctus* has been united. The genus has never before been recognized outside of Europe.

9. *Tachytrechus volitans*, n. sp. (Fig. 8.)

Male.—Differs from *Floridensis* as follows: Front thickly covered with brownish dust, face with ochraceous dust. First joint of antennæ, when viewed from behind, brownish; when viewed from the front, opaque-black, except inner projection. Ground-colour of thorax of a brilliant metallic copper-colour, which shines through the thick coating of brown dust. Pleura and coxæ heavier white-dusted. Hind femora dark up to very tip. Pulvilli relatively longer, snow-white. Abdomen more cupreous. Pedicel of hypopygium more slender; hypopygium with penis projecting, distinct; lamellæ of similar form, but without the long black basal bristles, and evenly and closely fringed on outer side with longer hairs. The spot at tip of wing arises at tip of third vein and passes back so that the fourth vein bisects it. The third vein arches posteriorly at outer fourth. The fourth vein bends backwards at tip. The posterior cross-vein is less oblique and more sinuate.

The female differs from the male in the same characters as in *Floridensis*.

One male and one female, from twelve miles north-west of Lusk, Wyoming; July, 1895; from the collection of the University of Kansas

10. *Tachytrechus protervus*, n. sp. (Figs. 6, 7.)

Male.—Length 4.25 mm., of wing 4 mm. Face narrowed in middle, silvery dusted, yellower toward antennæ. Antennæ large, yellow; first joint short, second and third fully developed; third joint rounded, infuscated above and toward tip, bearing the dorsal arista once and two-thirds the length of the antenna. Vertex brownish-velvety. Post-ocular cilia black above, pale yellow, slender below. Thorax piceous green; above the base of the wing the horizontal black velvety macule and anterior silvery spot are present, above the former the dorsum is cupreous. Abdomen dark green, silvery dusted along sides, incisures well marked. Hypopygium piceous, lamellæ subrectangular, dark, hairy, evenly fringed with short black hairs, which are lighter dorsally toward base. Pleura

black, silvery-dusted; metapleura prominent; coxæ concolorous except extreme tip, fore coxæ bronze-dusted in front. Legs black, except the following: Tips of femora below, basal two-thirds of middle and hind tibiæ, and front metatarsi, which are dark yellowish. The fore legs are ornamented as follows: Tibiæ thickened, dusted with yellow on anterior surface, and with longitudinal rows of short black bristles; tarsi compressed, first joint a little shorter than the rest together, pulvilli large. Wings hyaline; anal angle much fuller than in *angustipennis*; fourth vein turned forward toward third, ending considerably before the tip of the wing; posterior cross-vein distant its length from the apex of the fifth vein, bowed inward and surrounded by a very faint cloud. Tegular cilia black.

Female.—Length 5.5 mm., of wing 5 mm. Differs as follows from the male: Face ochraceous. Infra-ocular cilia a little stronger. Vertex, thorax, and abdomen a more brassy, brighter green. Red at tip of femora more spread, and at base of middle and posterior tibiæ more restricted; fore tibiæ yellow, with ordinary bristles: fore tarsi not compressed, first joint equal to next three. Wings with faint yellowish tinge, cross-vein more oblique.

One male from Clementon, N. J., May 10, 1896, and one female from Delaware Water Gap, N. J., July 8. Both specimens were received from Mr. C. W. Johnson.

The following combination of characters briefly distinguishes this species from all the known species of *Tachytrechus:*

Male artista without an enlargement; fourth vein curved forward, ending near third and distant from tip; cilia of inferior orbit pale; wings unspotted; antennæ largely red; fore femora plain, more or less yellow-tipped.

In 1878 Mik* established the genus *Macellocerus*, basing it upon *Tachytrechus mœchus*, Loew. From *Tachytrechus* this genus differed thus: "Zweites Fuehlerglied rudimentaer, das dritte klein, mit ausserordentlich verlaengerter, dorsaler Borste, welche am Ende schaufelfoermig erweitert ist. Der letzte Abschnitt der vierten Laengsader convergirt stark gegen die dritte, so dass die Muendungen dieser beiden Adern nahe einander stehen." The addition of *protervus* leaves *Macellocerus* based upon a single male character. Concerning the inadvisability of erecting a genus upon *mœchus*, Dr. Loew had already written.†

*Zur Kenntnis der Dolichopodiden, Dipterologische Untersuchungen, p. 5.
†Monographs of N. Am. Dolichopodidæ, p. 112.

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA

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(Paper No. 1.)

In the CANADIAN ENTOMOLOGIST, during the year 1898, I gave a series of papers on the classification of the horntails and sawflies, representing the superfamilies SIRICOIDEA (Xylophaga) and TENTHREDINOIDEA (Phytophaga); while the past year, 1899, I gave a classification of the entomophilous wasps, or the superfamily SPHECOIDEA (incorrectly spelt Sphegoidea).

The present year, 1900, with the permission of the Editor, it is my intention to give a similar series of papers on the classification of the superfamily VESPOIDEA, a large natural group, representing the genuine fossorial wasps, the papermaking wasps, potter wasps, and the predaceous, inquilinous and parasitic wasps.

The wasps belonging to this superfamily are apparently closely allied to the wasps in the superfamily Sphecoidea, and have been quite recently classified with them; but they differ too widely, in various ways, to be included in the same family.

The superfamily Vespoidea I consider a compact, natural group, and it is readily separated from the Sphecoidea by the species falling in it *always having the posterior lateral angles of the pronotum extending back to and touching the tegulæ, leaving no space, or sclerite, between.*

The *trochanters* in all the families in this superfamily, except in the single family *Trigonalidæ*, are, as in the entomophilous wasps, composed of a single joint; but in this family, however, there are *two* more or less well defined *joints*, a character overlooked when I published my table of superfamilies in the Journal of the N. Y. Entomological Society, Vol. VII., p. 46.

The table, therefore, should be corrected to read as follows:

cc. Trochanters 2-jointed.

Mandibles large, 4-dentate; hind wings *with* a distinct venation, with two basal cells and a radius.....Superfamily III., Vespoidea (pars).

Mandibles never very large nor 4-dentate, either simple, bidentate, or at most 3-dentate; hind wings *without* a distinct venation, at most, and *rarely*, with only one basal cell, the radius always absent.....Superfamily V., Proctotrypoidea.

SUPERFAMILY III.—Vespoidea.

The families belonging to this superfamily may be distinguished by the characters made use of in the following table:

Table of Families.

Abdomen either sessile or petiolate, with the first ventral segment distinctly separated from the second by a more or less deep *constriction* or *transverse* furrow; legs most frequently fossorial..5.

Abdomen either sessile or petiolate, but the second ventral segment *not* separated from the first by a strong constriction or transverse furrow; if somewhat constricted, then the legs are *not* fossorial and the wings are usually folded in repose; in the former case the legs may be either fossorial or simple.

Posterior legs usually short, the femora rarely reaching to or at least extending much beyond the middle of the abdomen; legs most frequently not fossorial.....2.

Posterior legs long, the femora most frequently reaching to or beyond the tip of the abdomen; tibiæ in ♀ most frequently serrate or spinous, more rarely entirely smooth; middle tibiæ with two apical spurs.....Family XXVII., Pompilidæ.

2. Wings not folded in repose; ♀ sometimes apterous.....3.

Wings folded in repose; never apterous.

Claws simple; middle tibiæ with two apical spurs; sexes three, ♀ ♀ ♂.....Family XXVIII., Vespidæ.

Claws with one or more teeth beneath; middle tibiæ with one or two apical spurs; sexes two, ♀ and ♂..Family XXIX., Eumenidæ.

3. Metathoracic angles usually acutely produced, the metanotum posteriorly concave; scutellum large, flat, convex, conical or spined; if the metathoracic angles are rounded, which occurs rarely, the abdomen has only from 3 to 5 visible segments.

Abdomen normal, with at least 6 distinct segments, the venter flat; antennæ usually strongly clavate, in ♀ knobbed at apex; scutellum very large, flat; species *not* metallic; antennæ never more than 12-jointed.....Family XXX., Masaridæ.

Abdomen abnormal, with from 3 to 5 visible segments, the terminal segments most frequently retractile, telescopic-like, the venter concave or flat; species metallic; antennæ most frequently filiform, inserted close to the anterior border of the head, 13-jointed, scutellum convex, conical or spined, rarely flat..... Family XXXI., Chrysididæ.

Metathoracic angles rarely toothed or acutely produced, the metanotum posteriorly squarely truncate or rounded, not concave; scutellum normal or in some wingless females entirely absent; antennæ filiform or subclavate, rarely flabellate in some males; abdomen always with more than 5 dorsal segments.

Hind wings *with* a distinct venation, and always *without* anal lobes; females never apterous. ..... 4.

Hind wings *without* a distinct venation, and always *with* an anal lobe; females often apterous; middle tibiæ with two apical spurs; antennæ 10- to 26-jointed... Family XXXII., Bethylidæ.

4. Trochanters 2-jointed: middle tibiæ with *two* apical spurs; eyes normal, *not* emarginate within; antennæ long, filiform, 15-jointed or more, similar in both sexes.....Family XXXIII., Trigonalidæ.

Trochanters 1-jointed; middle tibiæ with *one* apical spur; eyes reniform or emarginate within; antennæ in ♀ 12-jointed, in ♂ 13-jointed ..... Family XXXIV., Sapygidæ.

5. Middle coxæ contiguous or nearly..... 7.

Middle coxæ distant, usually widely separated..... 6.

6. Stigma in the front wings *not* well developed, at the most only slightly developed, either very small or linear; eyes most frequently emarginate within; middle tibiæ with two apical spurs.

Pygidium in ♂ deeply emarginate at apex, the hypopygium terminating in a sharp thorn or aculeus, which curves upwards and rests in the emargination of the pygidium; claws cleft..... Family XXXV., Myzinidæ.

Pygidium in ♂ entire, or at most with only a slight sinus, the hypopygium terminating in three spines; claws simple..... Family XXXVI., Scoliidæ.

Stigma in front wings well developed, ovate or subovate; eyes entire, never emarginate within; pygidium in ♂ entire, the hypopygium terminating in a sharp aculeus which curves upwards..... Family XXXVII., Tiphiidæ.

7. Females always apterous, and frequently, but not always, without ocelli; eyes variable.....9.

Females always winged, with ocelli; eyes large, always extending to base of mandibles.....8.

8. Abdomen sessile or subsessile, and often with a more or less distinct constriction between dorsal segments 1 and 2; front wings with the stigma well developed, the marginal cell usually attaining the costa at apex (rarely rounded or truncate at apex, with a slight space between *Cosila* and allies); hind wings usually without an anal lobe, the cubitus either interstitial or originating beyond the transverse median nervure; very rarely originating before it; tibial spurs 1, 2, 2; tarsal joints normal; eyes entire; ocelli normal; hypopygium entire, not ending in a spine or an aculeus. Family XXXVIII., Cosilidæ.

Abdomen longly petiolate: front wings with the stigma small, not well developed, the second recurrent nervure subobsolete: hind wings bilobed, the cubitus originating far beyond the transverse median nervure; tibial spurs very long, straight; tarsal joints 2–3 in ♀ dilated, deeply excised or lobed and filled with a membrane between the lobes: eyes emarginate within; ocelli very large: antennæ very long, filiform, the joints with a bristle-like spine at apex.....Family XXXIX., Rhopalosomidæ.

9. Middle tibiæ with two apical spurs, rarely with one only, or none in some males.

Middle coxæ usually slightly separated by a triangular or bilobed projection of the mesosternum; females with the thorax divided into three parts, the pygidium usually subcompressed or otherwise formed, usually abnormal; hypopygium in ♂ most frequently armed.....Family XL., Thynnidæ.

Middle coxæ contiguous, not separated by a triangular or bilobed projection of the mesosternum, the latter being squarely truncate at apex.

Thorax in the ♀ divided into two parts; pygidium normal; hypopygium in ♂ produced into a sharp aculeus which curves upwards (very rarely simple, unarmed); hind wings *with* a distinct anal lobe, the cubitus originating from the apex of the submedian cell, interstitial with the transverse median nervure, or rarely originating beyond it.....Family XLI., Myrmosidæ.

Thorax in ♀ undivided, all the parts being closely united or soldered together, and *without* visible sutures between ; pygidium normal ; hypopygium in ♂ simple, unarmed, but the genital plate is armed with two slender straight spines which project more or less distinctly from the tip of the abdomen ; hind wings *without* an anal lobe, the cubitus originating far *before* the transverse median nervure..... Family XLII., Mutillidæ.

Family XXVII.—Pompilidæ.

This family, which is the first to be treated of in the superfamily, has long been known under the family name *Pompilidæ*.

The first genus to be described in the family, however, was *Ceropales*, Latreille, in 1796, which antedates *Pompilus*, Fabr., fully two years, the latter not being described until 1798, so that, following the now well-established rule in zoological nomenclature, viz., that a family name must be based upon the first genus described, the name *Pompilidæ* should probably give way to Ceropalidæ.

I am opposed to changing a well-established family name, and after much hesitation and long deliberation, I venture to retain this long-established family name.

The family Pompilidæ is quite distinct from all the others in the superfamily, by the uniform *habitus* of the species, the only group with which any of the species could be confused being probably some forms in the *Vespidæ* (subfamily Polistinæ), some species of which bear a superficial resemblance in size, colour and shape to *Pompilus* and allies ; but the non-folded wings, the venation of the wings, and the length and characteristic features of the legs, as well as cephalic, mandibular and palpal characters, readily separate them from the Vespidæ.

The history of the family and our present knowledge of the genera, may be best shown by giving the bibliography of the genera in chronological order, as follows :

1796.—*Ceropales*, Latreille, Prec. car. gener. Insect, p. 123. 1798.—*Pompilus*, Fabricius, Syst. Entom. Suppl., p. 246. 1804.—*Salius*. Fabricius, Syst. Piez., p. 124. 1806.—*Cryptocheilus*, Panzer, Krit. Revis. II., 120. 1808.—*Aporus*, Spinola, Insect. Ligur., II., p. 5. 1822.—*Planiceps*, Latreille, Nouv. dict. hist. natur., p. ?. 1830.—*Macromeris*, Lepeletier, Magas. de Zool., I., pp. 29-32. 1836.—*Chirodamus*, Haliday,

Trans. Linn. Soc. Lond., XVII., p. 326. 1837.—*Agenia* (p. 321), *Priocnemis* (Prionocnemis), p. 325, and *Episyron*, p. 34., Schiödte. Naturh. Tidsskr., I. 1840.—*Mygnimia*, Shuckard. Nat. Arrang. Insects, p. 179. 1844.—*Platyderes*, Guerin, Icon. regn. anim., VII., Insects, p. 435. 1845.—*Entypus* (p. 35), *Hemipepsis* (p. 123), *Homonotus* (p. 414), *Pogonius* (p. 453), *Ctenocerus* (p. 456), and *Cyphononyx*, Dahlb. (p. 461), Hym. Eur., I. 1845.—*Evagetes* (p. 390), *Micropteryx* (p. 396), *Calicurgus* (p. 397), *Anoplius* (p. 442), *Ferreola* (p. 467), and *Pallosoma* (p. 492), Lepeletier, Hist. nat. des Ins. Hym., III. 1851–2.—*Clavelia*, Lucas (= Ctenocerus, Dahlb., preoc.), Ann. Soc. ent. Fr. (2), IX.; Bull., p. 1, XXV.; et (2) X., p. 417. 1855.—*Maurillus* (p. 170), *Notocyphus* (p. 172), and *Parapompilus* (p. 176), Smith (= Micropteryx, Lapel., preoc.), Cat. Hym. Brit. Mus., III. 1867.—*Entypus*, Saussure, *nec* Dahlbom, Reise de Novara, Hym., II., p. 50. 1884.—*Paracyphonyx*, Magretti, Ann. Mus. civ. Genova, XXI., p. 44. 1884.—*Sphictostethus*, Kohl (p. 47); *Hoploneura*, Kohl (p. 47), = Hoploneurion, Kohl, and *Epipompelus*, Kohl (p. 57), Verh. Zoolog.-bot. Gesell. in Wien. 1887.—*Diplonyx*, *Cyphonyx* (Cyphononyx), *Heteronyx*, and *Schistosalius*, Saussure, Soc. Ent., II., p. 3. 1887.—*Lophopompilus*, p. 42, and *Pompiloides*, Radoszkowski, p. 94, Horæ Soc. Ent. Ross. XXI. 1887.—*Telostegus* (p. 88), *Wesmælinus* (p. 46), and *Pseudopompilus* (p. 80), Costa (A.), Prosp. Imen. Ital., II. 1888.—*Pseudoferreola*, Radoszkowski (p. 477), *Ceropaleoides* (p. 486), and *Prionocnemoides*, Radoszkowski, Bull. Soc. Natural d. Moscow. 1889.—*Meracus*, Tournier, Entom. Genev., I., p. 137. 1892. -*Hemisalius* (p. 313), *Hemipogonius* (p. 334), *Stenagenia* (p. 338), *Ctenagenia* (p. 342), and *Schistonyx*, Saussure, in Grandidier's Hist. de Madagascar, XX.

Classification of the Family.

Comparatively little effort has been made by those who have treated of these wasps to indicate the natural major groups of the family, or to indicate the natural relationship of the different genera.

Lepeletier, in Histoire Naturelle des Insectes, Hymenopteres, tome III., 1845, treats the family as representing two tribes in his Famille 14, Les Sphecides, viz., 4e Tribu. Pompilites, with 9 genera: *Aporus*, *Evagetes*, *Planiceps*, *Salius*, *Micropteryx*, *Calicurgus*, *Pompilus*, *Anoplius* and *Macromeris*; and 5e Tribu. Pepsites, with 4 genera: *Ceropales*, *Ferreola*, *Pepsis* and *Pallosoma*.

Frederick Smith, in his Catalogue of the Hymenoptera in the British Museum, Vol. III., 1855, ignores these tribes, but correctly treats the family as distinct from the Sphecidæ. He has recognized 13 distinct genera, arranged in the following sequence: *Pompilus*, *Maurillus* n. g., *Salius*, *Notocyphus* n. g., *Ctenocerus* (=Claveliia, Lucas), *Planiceps*, *Aporus*, *Parapompilus* n. n.; for *Micropteryx*, Lepel.; *Ceropales*, *Macromeris*, *Mygnimia* and *Pepsis*.

Under the genus *Pompilus*, Smith incorrectly includes as synonyms *Priocnemis*, *Agenia*, *Episyron*, *Calicurgus* and *Anopilus*. *Maurillus*, Smith, placed by Dalla Torre in his recent catalogue as a synonym of Pompilus, does not belong to the family, but is evidently a good genus in the family *Cosilidæ*, to which family also belong *Dicrogenium*, Stadelmann, described as a Bethylid, and *Fedtschenkia*, Saussure, at present placed with the *Mutillidæ*.

The next paper of any great importance on the group, is by Dr. Franz Frederick Kohl, entitled "Die Gattungen der Pompiliden," published in the Verhanlungen Zoolog-botanischen Gesellschaft in Wien, 1884, pp. 33–58.

In this important contribution Dr. Kohl gives a table of genera and has recognized as valid 15 genera and several subgenera and groups, arranged as follows.

I.—*Macromeris*, Lepeletier. Type M. splendida, Lepel. II.—*Agenia*, Schiödte. Types A. variegata, L., and A. bifasciata, Fabr. III.—*Pseudagenia*, Kohl, n. g. Type Agenia carbonaria, Scop. IV.—*Salius*, Fabricius. Types S. bicolor and S. punctatus, Fabr., =*Priocnemis*, Schiödte; *Hemipepsis*, Dahlb.; *Homonotus*, Dahlb.; *Entypus*, Dahlb.; *Pallosoma*, Lepel.; *Mygnimia*, Smith.

Four groups of subgenera are indicated: Gr. (1) Cyphonyx, (2) Priocnemis, (3) Hemipepsis, and (4) not named, with *Hemipepsis heros*, Guerin, as type. V.—*Calicurgus*, Lepeletier. Type C. fasciatellus, Lepel. VI.—*Pepsis*, Fabricius. Types P. ruficornis, dimidiata, amethystina, cœrulea, stellata, elevata, and grossa, Fabr. VII.—*Sphictostethus*, Kohl, n. g. Type Pompilus Gravesii, Hal., =Agenia speciosa, Spin. VIII.—*Hoploneura*, Kohl, n. g. Type H. apogona, Kohl. This genus was subsequently changed to Hoploneurion. IX.—*Parapompilus*, Smith, =Micropteryx, Lepel. Type P. (Micropteryx) brevipennis, Lepel. X.—*Claveiia*, Lucas, =Ctenocerus, Dahlb. Type C. pompiliformis, Lucas. XI.—*Notocyphus*, Smith. Type N. lævis-

simus, Smith. XII.—*Ceropales*, Latreille. Type C. maculata, Fabr. XIII.—*Pompilus*, Fabricius. Types P. viaticus, ursus, Fabr., = Aporus, Spin.; Episyron, Schiodte; Anoplius, Lepel.; Evagetes, Lepel.; Salius, Dahlb.; Homonotus, Dahlb., and Ferreola, Smith.

Dr. Kohl, however, recognized 18 minor groups, briefly defined, but without specifying, in most cases, the species belonging in them. His groups he has arranged thus: Gr. (1), *Pompilus*, Thoms.; Gr. (2), *Aporus*; Gr. (3), no name; Gr. (4), no name; Gr. (5), *Aporus*; Gr. (6), no name; Gr. (7), no name; Gr. (8), *Aporus*; Gr. (9), no name; Gr. (10), *Aporus*: Gr. (11), *Aporus*; Gr. (12), *Episyron*, Schiödte; Gr. (13), *Pompilus 6-maculatus*, Spin., *venustus*, Wesm., *fraterculus*, Costa; Gr. (14), *Aporus*; Gr. (15), *Homonotus*, Dahlb., p. 35; *Salius sanguinolentus*, Dahlb., p. 34; Gr. (16), *Ferreola*, Smith; Gr. (17), *Ferreola*, Smith; Gr. (18), *Pedinaspis*, Kohl. Type *P. operculatus*, Klug.

XIV.—Planiceps, Latreille. Type *Pompilus planiceps*, Latr. XV.—Epipompilus, Kohl, n. g. Type *E. maximiliani*, Kohl.

This arrangement of Dr. Kohl's is in no sense a natural one. He has "lumped" many good genera (or natural groups) and interpolated, or at least brought into juxtaposition, genera or groups that are *widely separated*, and, again, widely separated others that are closely allied. I hope to bring this out clearly in my tables later on, when I shall call more special attention to some of these unnatural groupings.

Dr. Paolo Magretti, in this same year, 1884, in the Ann. Mus. Civ. Genova, Vol. XXI., p. 44, established the genus *Paracyphonyx*, an interesting new genus allied to *Cyphonyx*.

In 1887, Achilles Costa, in his Prosp. Imen. Ital., II., established three new genera, recorded above.

Genl. O. Radoszkowski, in the Bull. de la Soc. Imp. des Nat. de Moscow, (2) II., 1888, in his paper entitled "Revision des armures copulatrices des males de famille Pompilidæ," points out and figures excellent characters in the male genital organs of several genera. The difference in the male copulatory organ in *Ceropales* was so great that he remarks: "L'armure copulatrice du genre *Ceropales* n'a rien de commun avec la famille Pompilidæ, except la presence de palpes genital."

Genl. Radoszkowski subsequently makes *Ceropales* the type of a distinct family, the *Ceropalidæ*. The group is a natural one, and is here treated as a subfamily.

Tournier's genus *Meracus*, established in 1889, Entom. Genev., I., p. 137, I do not know, nor have I seen the description.

Saussure, in Grandidier's Histoire de Madagascar, Vol. XX., 1892, following the ideas of Lepeletier, recognized two tribes, *Pompiliens* and *Pepsiens*, but gives no substantial characters to support this separation, his tribe Pepsiens being composed of the genus Pepsis, and the Pompiliens of all the other genera.

The last author who has treated of the family is our well-known American hymenopterologist, Wm. J. Fox, of the Philadelphia Academy of Sciences, who, in the Proc. Phila. Acad. Sci. for 1894, divided the family into three tribes, (1) Ceropalini, (2) Notocyphini, and (3) Pompilini.

Two of these groups, the Ceropalini and the Notocyphini, are natural groups, the first correctly separated by Radoszkowski, but the third, or the Pompilini, is, as interpreted by Fox, a most unnatural group —a *potpourri* for the residue of the Pompilid genera.

The greatest difficulty in a study of the family has been the correlation of the very dissimilar sexes of some of the genera and the separation of the family into natural major groups. This difficulty has been the stumbling-block upon which most of the older authors fell, and upon which even to-day some of our most active workers are stumbling. Two or three cases may be cited for example: Fox, in Tr. Am. Ent. Soc., XVIII., described two Pompilids from Jamaica, *Salius opacifrons* ♀ and *Agenia compressa* ♂; both, however, represent a single species, and neither sex belongs to the genus assigned to it by Fox. Another case in point is the *Agenia belfragei*, Cresson, a male insect, which was probably placed here by Cresson and Fox on account of the smooth, non-spinous legs, but which has no relation with a true Agenia.

Many other cases could be cited, but these, I think, will do to show the difficulty of the study of the Pompilidæ, and how deficient our generic definitions must be when our most able hymenopterologists are so easily led astray by superficial resemblances.

My studies in the family convince me that there are at least six major groups in the family, designated here as subfamilies, distinguished as follows:

Table of Subfamilies.

Labrum large, *free*, distinct; anterior tarsi in ♀ always *without* a comb, the hind tibiæ smooth, never *spinous*, or at most with only a few *feeble*, scarcely perceptible spines.....5.

Labrum neither large, *free*, nor distinct, usually entirely hidden under the clypeus, or at most with only a part—the tip—exposed; anterior tarsi in ♀ most frequently *with* a comb; hind tibiæ in ♀ frequently serrate and spinous, or only spinous, more rarely smooth, *without* spines, except in males.

Second ventral segment always *without* a transverse grooved line, impression or emargination; hind tibiæ in ♀ *never* serrate, although usually spined in both sexes; stigma rarely well developed.....2.

Second ventral segment in ♀ *with* a distinct transverse grooved line, impression or emargination; stigma well developed.

Hind tibiæ in ♀ most frequently strongly serrate and also spinous, rarely *without* teeth or indistinctly serrate, in the latter case with a strong longitudinal ridge; in ♂ simple, neither serrate nor spinous, the hind tarsi very long, often more or less flattened or compressed, the basal joint long and often bent or more or less curved; second ventral segment *with* a transverse grooved line or emargination in both sexes.....Subfamily I., Pepsinæ.

Hind tibiæ in *both* sexes smooth, *without* teeth or spines, at the most with *very* minute, scarcely perceptible or feeble spines, never with a distinct longitudinal ridge; second ventral segment *with* the transverse grooved line present in ♀ only, absent in ♂.....Subfamily II., Ageniinæ.

2. Hind tibiæ in *both* sexes smooth, *without* spines, or at most with very *minute*, scarcely perceptible or feeble spines.....3.

Hind tibiæ in *both* sexes always strongly or distinctly spined, the spines always well developed.

Antennæ inserted on the anterior margin of the head *on* or *below* an imaginary line drawn from the base of the eyes; head antero-posteriorly very thin, the face, clypeus and temples in ♀ very flat.....4.

Antennæ inserted *far above* such a line, or on or *near* the middle of the face, or at least considerably *above* the basal suture of the clypeus; head normal, or nearly; front wings with two or three cubital cells.

Clypeus anteriorly not produced, truncate or emarginate, not wholly covering the mandibles; pronotum rarely long.....Subfamily III., Pompilinæ.

Clypeus anteriorly semicircularly produced, covering the mandibles; pronotum always long, at least as long as the mesonotum..... ....Subfamily IV., Planicepinæ (pars).

3. Front wings with three cubital cells.

Head antero-posteriorly not especially thin, the face and clypeus at least subconvex, never flat; the antennæ inserted *on* or *near* the middle of the face, always considerably above an imaginary line drawn from bases of eyes. (Males only).Subfamily II., Ageniinæ.

Head antero-posteriorly very thin, the face and clypeus very flat, the antennæ inserted towards the anterior margin of the head *on* or or just above an imaginary line drawn from bases of eyes (♀ and ♂).....Subfamily IV., Planicepinæ (pars).

4. Pronotum as long or longer than the mesonotum; front coxæ long, usually longer than the hind coxæ, the front femora in ♀ often much swollen or greatly incrassated.....Subfamily IV., Planicepinæ.

5. Pronotum very long; metanotum as long or longer than the mesonotum; eyes entire, *not* at all emarginate within; antennæ in ♀, after death, involute at tips; cubitus in hind wings interstitial or originating *before* the transverse median nervure; hind tibiæ not or rarely longer than their femora, usually shorter.....Subfamily V., Notocyphinæ.

Pronotum not long, shorter than the mesonotum; metanotum short, much shorter than the mesonotum and obliquely truncate posteriorly; eyes *subemarginate within*; antennæ in ♀, after death, straight, *not* involute; cubitus in hind wings originating *beyond* the transverse median nervure; hind tibiæ much longer than their femora.....Subfamily VI., Ceropalinæ.

THE LARVA OF EUSTIXIA PUPULA, HUBN.

BY HARRISON G. DYAR, WASHINGTON, D. C.

The larva of this not uncommon little Pyralid feeds on the seeds of the peppergrass. It has not been described heretofore; the name as given by Packard (American Naturalist, IV., 229) is an error of identification, the species which he represents, copied from Abbot's manuscript drawing, being *Endemia crassinervella*, Zell., a Tineid. The true larva of *E. pupula* lives singly in the heads of the peppergrass in a loose open web, eating the unripe seeds out of the flat pods, forming two holes in each pod on the upper side. The larvæ, though fully exposed,

are difficult to see, as their colours harmonize well with the general appearance of the flower heads. The delicate open web is not conspicuous.

The number of larval stages has not been definitely determined, but I think there are seven. At first the little larva is entirely green, the head only pale testaceous. Later (by stage IV.) there are faint subdorsal and subventral pale shades with slight dusky bands between.

Stage V.—Green, subdorsal and subventral lines yellowish, faint, not distinctly broken in the incisures, the red shades between them faint; width of head 8 mm.

Stage VI.—Head slightly below joint 2, testaceous green, the clypeus high; width 1 mm. Body slender, green, the segments faintly transversely banded with yellow, also yellowish subventrally; dull crimson dorsal and lateral patches in the yellow bands, fainter at the extremities. Setæ long, slender, dusky, iv. + v. on the prominent subventral fold.

Stage VII.—Head green, mottled with brown over the lobes, ocelli black; width 1.2 mm. Body green, subventral fold narrowly whitish, dorsal segmental bands of dull crimson reaching the subventral fold, the edges irregular, projecting a little before at the spiracle. Setæ fine, dusky, rather long. The bands are on every segment from the prothoracic to the tenth abdominal.

Cocoon of silk, small and tough.

Food plant peppergrass *(Lepidium virginicum).*

LARVÆ FROM HAWAII—A CORRECTION.

BY HARRISON G. DYAR, WASHINGTON, D. C.

Meyrick's work on the Macrolepidoptera of the Hawaiian Islands* is a revelation of our previous ignorance of that fauna, since he describes no less than 200 new species out of a total of 292.

I have formerly described the larva of a Noctuid from Hawaii as *Laphygma flavimaculata*, Harv., but find, on consulting Mr. Meyrick's paper, that the name was wrongly applied. The five larvæ bred by me in Hawaii are as follows: —

Lycæna boetica, Linn.

Larvæ within the flowers of *Crotalaria longirostrata* at Honolulu.

*Fauna Hawaiiensis, Vol. I., part 2, Macrolepidoptera, by E. Meyrick, 1899.

Eggs, four larval stages and chrysalis observed; widths of head .15, .3, .6, 1.0 mm. It is not necessary to describe at length this common European species.

Sphinx convolvuli, Linn.

Described as *Protoparce cingulata*, Ent. News, VI., 95, 1895.

Spodoptera mauritia, Boisd.

Described as *Laphygma flavimaculata*, Can. Ent., XXVI., 65, 1894. The true *flavimaculata*, Harv. (= *Spodoptera exigua*, Hübn.), was taken, but not bred. The species were confused.

Plusia chalcites, Esp.

Larva a general feeder; found at Honolulu. Abdominal feet on joints 9, 10 and 13. Head rounded, clypeus large, green, with a few black dots in some and a line on the side, some distance behind the ocelli. Body green, somewhat transparent, tubercles black. Double dorsal and subdorsal lines, crenulate, pale yellow, the subdorsal ones forming curves around the tubercles, not crossing them; a single, straight faint substigmatal line; spiracles black.

Pupa very pale green with a broad brown band on the back, which is irregularly streaked transversely with darker brown. In a thin cocoon of white silk.

Found on Ipomœa, Crotalaria, Canna, etc.

Omiodes Blackburni, Butl.

Meyrick says the larva feeds on banana; but all mine were found on cocoanut palm (*Cocos nucifera*), to which they were very injurious. Found at Honolulu, sewing together the leaves behind, in the folds, with bands of thread at intervals. Several larvæ together; they eat at the top and finally spin cocoons at the base of the leaf. Head rounded, median suture not deep, clypeus and mouth-parts small; minutely shagreened, not conspicuously; setæ rather long; dull white, sordid, almost testaceous, with six moderately large black spots on each lobe, one over ocelli, one above this in line with another near the top of the clypeus; one above this latter and another very near the median suture; two more below the vertex, elongate and almost contiguous, directed towards the side of head; jaws pale brown, black at base and tip; width 3 mm. Body elongate, slender, transparent and nearly colourless, the green food showing by transparency. Joint 13 divided by a moderately distinct suture. Tubercles i. to iii. large, almost perfectly flat, transparent; subventral

tubercles smaller and indistinct. A pale yellow, double, dorsal line, edging the dorsal vessel; tracheæ white, showing by transparency; spiracles small, faintly yellowish; feet pale. Pupa cylindrical, slender, slightly tapering, the antennæ and leg-cases projecting beyond the wing-cases; cremaster conical, not much flattened, terminating in several recurved spines. Colour pale brown, darker in the abdominal sutures. Length 17, width 4 mm.

TORONTO BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The fifth annual meeting of the Toronto branch of the Entomological Society of Ontario was held on Friday evening, April 6th, in the Education Department. The chair was occupied by the Vice-President, Mr. E. M. Walker, and there was a good attendance of members. Four new names were proposed for membership. The President, Mr. Arthur Gibson, owing to his duties as assistant in the Division of Entomology at the Central Experimental Farm, Ottawa, was unable to be present, but sent his address. The report of the Council showed that the Branch had had a very successful year, fifteen meetings being held and a number of interesting papers contributed. Members of the Montreal Branch were thanked for the courteous exchange of papers with the Toronto Branch. The reports of the Librarian and Treasurer also showed the continued prosperity of the Branch. These reports, on motion, were received and adopted. The following officers were elected for the ensuing year :— D. G. Cox, President; E. M. Walker, Vice-President; G. M. Stewart, Secy.-Treasurer; H. C. Austen, Librarian; and R. J. Crew and C. H. Tyers, members of Council. The address of the retiring President was read by the Chairman, and reviewed the work of the Branch since its inception, particular mention being made of the year just ended. The members were urged to make extra efforts the coming summer to collect and mount specimens for the collection which the Branch is forming for the Education Department. The latter portion of the address took the form of a practical, illustrated paper on "The Preservation of Larvæ by Inflation."

BOOK NOTICE.

Twenty-third Report on Observations of Injurious Insects and Common Farm Pests During 1899.—By Eleanor A. Ormerod, LL.D., F. R. Met. Soc., etc.

Miss Ormerod's last Report, which is the first of a new series, has just come to hand. As usual, it is full of interest to the entomologist, and contains many valuable practical suggestions for the farmer and fruit-grower.

There were, during 1899, complaints of the depredations of the ordinary farm and orchard pests, and also of a few which had been little noticed previously. The value of Dr. Ormerod's Reports to Canadian readers is shown by the large number of injurious insects treated of, which are now common to both Europe and America, or are represented on one continent by species closely allied to kinds with similar habits found on the other.

Cabbage butterflies of three species were very prevalent and destructive. Dusting the plants with a mixture of lime and soot was found to be of no avail, while syringing them with Little's "Antipest" was satisfactory. There is no mention of the simple and very effective remedy of dusting the plants with insect powder and flour, which has been found by far the best remedy in this country. An account is given of good work in lessening injury by collecting the butterflies. This was by the boys at Mr. W. Bailey's Aldersey Grammar School, in Cheshire. In the previous year the boys turned their attention to the caterpillars, and from 240 plants they gathered more than 5,000 caterpillars.

The Cheese and Bacon Fly.—This is the parent of the well-known "skippers" in cheese. These larvæ are also frequently found injuring hams. The remedies proposed are all of a preventive nature, such as the close screening of windows in ham and cheese curing rooms to keep the flies from entering, the frequent rubbing and turning of cheeses during the egg-laying season, and the destruction of the flies in the curing rooms by means of pyrethrum insect powder or the ordinary fly paper. All cracks in cheese should be filled at once with a mixture of flour, butter and pepper.

Portions of cheese or ham that are found to be attacked, should be cut out as soon as possible after observation; and, with regard to cheese, it is recommended that after cutting out the piece, a thorough dusting of

black pepper should be given and the cavity refilled with cheese and covered carefully with calico.

Leather Jackets.—The larvæ of the Crane Flies or Daddy Long-legs as enemies of grain crops and grass are treated of, and the use of nitrate of soda as a quick-acting fertilizer is recommended.

The Hessian Fly occurred at one locality, and a full resumé of the subject, compiled chiefly from United States reports, presents the important characteristics of the attack and the best remedies, in an attractive manner. Stress is laid on the importance of destroying the "flaxseeds" both in screenings and in stubble.

The Currant Gall Mite, an enemy of the black currant, which yearly causes much loss, is still under observation, and some interesting new experiments are reported as to discovering the method of distribution of the mites. It was found that plants cut down to the ground could be moved from an infested plantation, and there was no conveyance of infestation in the earth at the roots.

Flour and Grain Beetles.—Under this heading several familiar insect enemies of stored grain are treated of, viz.: The Rust-red Flour Beetle, the Cadelle and the Mediterranean Flour Moth.

The Grouse Fly (a parasite on grouse), the Hop Flea-beetle and the Land Planarian are the subjects of articles of much scientific interest.

Short Notices.—A new feature of this second series of Dr. Ormerod's Reports is a collection of short notes, in which recently-discovered facts on the appearance, habits, treatment or remedial measures are given of insects previously referred to at length in former Reports. Here we find, among other things, a mention of the occurrence in England of our troublesome Canadian enemy of the apple, the Eye-spotted Bud-moth; also a recommendation of a caustic alkaline spraying mixture of crude potash and caustic soda: and an attack upon strawberries by three species of ground beetles, the worst culprit being the Red-horned Ground Beetle *(Harpalus ruficornis)*.

This valuable Report of 152 pages is replete with useful and practical knowledge, which must of necessity be of enormous value to all who read it. The illustrations are excellent and the volume contains a most complete index, which much facilitates reference. J. F.

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The Canadian Entomologist.

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NEW TINEIDÆ, WITH LIFE-HISTORIES.

BY MARY E. MURTFELDT, KIRKWOOD, MO.

Laverna argentimaculella, n. sp.

Imago : *Antennæ* dark brown, slightly paler on under side. *Palpi* pale silvery, terminal joint in strong light appearing minutely ringed with dark blue. *Head* and face smooth, the former dark blue above, face pale golden-metallic, in the ♂ usually darker than in the ♀, in the latter often with bluish tinge. *Thorax* dark blue with metallic reflections. *Fore wings* with a generally "shaggy" appearance, beautifully variegated in dark and light blue and rich bronzy brown, with more or less conspicuous, irregular, appressed, silvery spots, that, at the base of the apical third, form an irregularly margined fascia, broader and more brilliant in the ♂ than in the ♀. Upon the cell, especially of the ♂, are two prominent tufts, bluish silvery at base, shading to brown, and near the outer margin two still larger tufts, almost connected, forming a ridge across the wing. Just before the fringes is an indefinitely angular, silvery streak, the apex directed outward. The pattern of coloration is so variable that it is difficult to exactly characterize it. *Hind wings* and *abdomen* rich bronzy brown, the former with pale brown fringes. *Legs* brown, annulate on tibiæ with two broad and on tarsi with three narrow white bands. *Alar expanse*, 8 mm.; length, 4 mm. A beautiful species and probably rare.

Larva: Length 5 mm., diameter 1.5 mm., tapering slightly in both directions from middle. Form sub depressed with deep incisions; pale green, at maturity showing on dorsum three more or less distinct pink stripes. Thoracic legs well developed, but pro-legs minute.

Mines leaves of *Œnothera biennis*. The mine begins in a winding track, which crosses back and forth, often becoming confluent. The dark, granular frass forms a rather definite line through the middle.

When ready to transform, the larva deserts the mine and incloses itself in a dense, oval, white silk cocoon formed against the midrib or in a wrinkle of the leaf. *Pupa* dark brown, not especially characteristic. Imago appears in nine or ten days.

The mines of this species were discovered about the middle of August, 1895, for the first and, so far, only time, on a small and ragged plant of wild Evening Primrose, and although other plants of the same species, as well as some cultivated varieties, were growing in close proximity, not a mined leaf could be discovered on any of these, nor has the insect, in this locality at least, reappeared since that date.

Less than a dozen moths were reared, of which one or more examples were sent to Lord Walsingham, Dr. Fernald, and the National Museum.

Epermenia pimpinella, n. sp.

Antennæ slender, rather more than one-half the length of the wings, dark cinereous, with short, dense, whitish pubescence, basal joint thickly scaled. *Palpi* rather coarsely scaled, second joint twice the length of apical, dark brownish-gray sparsely sprinkled with buff. *Head* and *thorax* gray brown with slight purplish iridescence in certain lights. *Patagia* oval, silvery, semi-erect. *Fore wings* varying in general colour from dark slate-gray to brownish, with an intermingling of dingy white scales and having a generally "smudged" appearance, when fresh displaying purplish reflections. The three rounded dorsal tufts are of spatulate stalked scales overlying a fine paler fringe. *Hind wings* narrowly lanceolate, with long fine silky fringes. *Abdomen* slender, dark silvery gray, with indistinct whitish annulations, most pronounced laterally. *Legs* gray with dingy white mottlings and with long bristle-like ciliæ at each joint. *Alar expanse* 12 to 14 mm., length of body 5 to 6 mm.

Eggs (obtained by placing fresh leaves in jar in which several moths of both sexes had emerged) scattered along the edges of the leaves, very minute, 0.25 mm. in length and less than half that in diameter, oblong in form, colour greenish-white with sculpturing visible only under the microscope, barely discernible by Tolles lens. On July 2nd by close examination found them on several leaves of the plant out

of doors. On July 6th they could not be seen, but the leaves were speckled with transparent spots, on the under side, showing black grains, probably the dried sap, and upon holding the leaves against the light the tiny larvæ were revealed, either still on the surface or having just cut their way between the two cuticles.

Mature larva.—8 mm. long, very slender, dull olive green or brownish in colour, with conspicuous darker tubercles each giving rise to several long, rather bristly hairs. Head large, smooth, pale brown with black trophi. Cervical collar semicircular, in colour and texture resembling the head. Full complement of legs and pro-legs, the latter unusually long. These larvæ are not confined to a single mine, but often leave one to excavate another and are therefore often seen crawling on the surface of the leaves. *Pupa*, slender, very pointed posteriorly, pale brown, inclosed in frail, open-meshed cocoon on under side of leaf or in angles of leaf-stalks. Imago appears in from 8 to 10 days in summer, and there are at least two successive broods.

This insect feeds by forming a puffy mine on *Pimpinella (Zizzia) integerrima*, in this locality a not very common Umbellifer. I first bred it many years ago, and took it with me when visiting the family of Dr. Fernald, and the latter traced it to the genus *Chauliodus*, Tr., but, as at that time I did not know that it was new and had not its complete life-history, did not attempt a description. Since then I have learned from Lord Walsingham and Mr. Durrant that *Chauliodus*, Treit., is preoccupied by *Epermenia*, Hüb., and also that the species was probably new to science.

Eucatoptus striatella, n. sp.

Antennæ long, dull ochreous, inclining to brown; basal joint comparatively large, especially in the ♂. *Palpi* with second and terminal joints about equal in length, second joint densely but closely tufted, pale buff or cinereous with indistinct leaden dots and shadings. *Head* and *thorax* pale buff, faintly striped with leaden gray. *Patagia* of the paler colour. *Fore wings* light brown or brownish-ochreous, sparsely speckled with black. A subcostal black, longitudinal line extends from base to apex, curving upward slightly and intensifying at the latter; beneath this, two more or less definite blackish striations, the one on inner margin being quite broad and diffused, while the discal streak is variable, not continuous, often consisting of two or three dashes. *Hind wings* silken, ashy white, shading to cinereous at tips. ♂ with pencil of spreading hairs from base

of costa. *Cilia* long, fine, concolorous with wing, with leaden tinge; on fore wings crossed with black line. *Legs* shining pale buff, more or less conspicuously mottled with leaden gray; hind tibiæ clothed with long silken hairs, in some specimens marked with a dash or spot of gray on outer side; tarsi annulate. *Alar expanse* 11 to 13 mm. Feeds in the berries of Nightshade (*Solanum nigrum*), eating the pulp and preventing the seeds from maturing.

Larva: 8 mm. long by 2 mm. in diameter, being rather stout. Cylindrical, incisions shallow, slightly larger at posterior end, where it terminates somewhat bluntly. Colour pale, translucent, greenish yellow, with five interrupted, irregularly margined, longitudinal, crimson stripes, lateral one composed of a row of small spots. Head small, cordate, only little more than one-half the width of the abdominal segments, very dark shining brown. Cervical shield almost covering the narrow first joint, of same colour as the head. On dorsum of eighth joint is a broad, purplish, subcutaneous spot. Thoracic legs minute, pro-legs also short, corresponding in colour to general surface. One annual brood, often found in two-thirds of the berries. *Pupa*, very slightly inclosed or merely attached within fold of leaf or in the berry cluster, rather stout, oblong, bright golden-brown, with short wing-sheaths, and has somewhat the appearance of dipterous pupæ. Imago in ten days—often not appearing until the last of October or early in November, suggesting the probability of an earlier brood in some other fruit or substance.

The genus *Eucatoptus* of the Gelechiadæ, characterized by Lord Walsingham in his work on West Indian Micro-Lepidoptera, is said to be "closely allied to *Aristotelia*, Hubn. (*Ergatis*, Hein.), from which it is distinguished by the costal hair pencil of the ♂." Under this genus His Lordship describes three new species and includes *Gelechia rubidella* Clem. (*G. rubensella*, Cham.). I am indebted to Lord Walsingham and his Entomological assistant, Mr. Durrant, for the generic determination of all the species described, as well as for much kind assistance on other forms.

Gelechia persicæella, Murt.

In this connection I wish to transcribe the description of a new Tineid of economic importance, of which an account was published in a paper on "Some Insects of the Year," in the Report of the State Agricultural College of Michigan for 1899, by Prof. R. H. Pettit, Assistant

Entomologist. The species was sent to me for determination, and learning that it was not represented in the Collection of the National Museum, nor in any other American collection, so far as I was able to ascertain, at the desire of Professor Pettit, I characterized it as new, under the genus *Depressaria*, with which, in palpal and some other points of structure, it quite closely corresponds. Recently Dr. Dietz, of Hazelton, Pa., and Mr. Busck, of the National Museum, have called my attention to the fact that its venation and other wing characters indicate that it is a *Gelechia*, to which I had, myself, at first assigned it. To bring it more generally to the attention of economic entomologists, as well as to correct the generic placing and some minor inaccuracies in the description, I copy as follows: *Imago—Antennæ* dark fuscous, indistinctly pectinate and banded on the under side with pale buff. Palpi long, exceeding the vertex. Basal joint short, pale; second joint one-third longer than apical. Brush quite dense, distinctly divided, dark fuscous overlaid with cream-coloured scales, palest on inner side. Apical joint dark, very slender, with extreme tip cream white, most conspicuously so in ♂. Tongue long, sparsely scaled. *Vertex* dark brown. *Face* cream white. *Thorax* and *tegulæ* purplish-brown. *Fore wings* almost black, with rich purplish gloss, and sparsely sprinkled with white scales. On the costa back of the apex is a small, irregularly triangular, cream white spot, and a few scattered scales of the same colour form an obscure outer border. In the cell near its upper margin are two somewhat indefinite, cream coloured dots in line, with a third one below and slightly back of the one nearest the base. Cilia fuscous, shading outward to gray. *Lower wings* shining silky, cinereous, almost silvery. Abdomen pale brown, terminal segment banded with buff at posterior margin. Lateral tufts buff, inconspicuous; anal tuft reddish-brown. Under surface speckled with brown and cream. *Legs* brown, annulate with cream white at the joints and middle of the tibiæ.

Alar expanse from 16 to 17 mm.

Prof. Pettit thus describes the larva and its habits:

"The larva, when full grown, is three-eighths of an inch in length, and quite slender. Its colour is dirty yellowish-white, with back and sides marked by six reddish-brown, longitudinal stripes, all of which extend the entire length from the thoracic shield to the caudal extremity, except the pair on dorsum, which unite on last segment and terminate there. Last

segment bordered caudally with fuscous, and base of anal pro-legs coloured the same. Venter marked along the middle with a stripe like those on dorsum and sides, which are about equidistant from each other and of about the same width as the spaces between them, colour reddish-brown. Some of the spaces (yellowish-white) have dark points in them. Head and thoracic shield yellowish-brown. Feet fuscous and dirty yellow. Four pairs of pro-legs besides anal pair, which are of the same colour as the ground colour of the body. Base of anal pair black.

"A number of these worms working in peach leaves were received from Mr. T. D. Atkinson, of Holland, Michigan, in September, 1898, and were said to be very troublesome. The same species was received on July 3rd, 1899, from Monroe, Michigan. One or two complaints were made from other places, though no specimens were sent.

"The larvæ are very restive, wriggling violently when disturbed. They bind together the leaves of the peach with fine white silk, forming nests of loosely-bound leaves, in which they live and where they change to pupæ. The finding of the larvæ on July 3rd, and also on September 17th, would seem a good indication that the insect is two-brooded. Specimens of the larvæ from Holland were placed in suitable cages, and the moth, a nearly black insect, spreading about five-eighths of an inch, was obtained the following spring. The adults commenced to appear about April 14th and continued to emerge till the middle of May. Of course this is much earlier than would happen if the insects were out of doors."

Prof. Pettit's article was accompanied by excellent enlarged illustrations of the larva and pupa.

CONDEMNABLE PRACTICES IN GENERIC REVISIONS.

Sir,—Permit me to call the attention of your readers to a faulty method of citing species names, which is, unfortunately, extremely common in America. I refer to the omission of the genus name or its reduction to a mere initial. In many cases this is, of course, a proceeding that is attended with no serious evil effects. A working zoologist may be expected to know what *P. machaon* stands for, bibliographers would know that a paper on Abnormal Antennæ of *Ajax* had nothing to do with the Bird genus, *Ajax*, Less., but referred to *Papilio ajax*. In many cases, however, authors seem to endeavor to render their work inaccessible to all save specialists working on their particular group. To make this clear

it is necessary to cite an example, and I take the first one at hand, remarking at the same time that these cases are very numerous, and that it is unjust to single out a particular person for condemnation.

In a paper published in Vol. 30 of the CANADIAN ENTOMOLOGIST, some 33 new genera of Phytophaga are proposed in consequence of the rearrangement of this group. In all cases, save one, the author is careful to state the species that served as types for the new genera, but in every case the old genus is represented by its initial merely, so that neither the direct statements of the author nor the context give the slightest clue to the name. Let us take a specific illustration. On pp. 286–287 is given a table of the genera of Hemichroinæ, of which three are recognized: "*Hemichroa*, CURTIS; *Opisthoneura*, ASHM., n. g. (type *O. crevecoeuri*, ASHM.); *Marlattia*, ASHM, n. g. (type *H. laricis*, MARL.)." What, pray, is *O. crevecoeuri?* It can not be *Opisthoneura*, for that is a new genus, and the species *crevecoeuri* is not new. What does *H. laricis* mean? It is true that in this case the bibliographer can, by comparing species by species with DALLE TORRE'S catalogue, ascertain with great probability what these initials mean; but this involves many hours of study, and the Hymenoptera form the only group for which this would be at all practicable. Indeed, the recorder of the Zoological Record did not take such pains, so that in his report the initials have been allowed to stand quite out of connection with the original grouping, so that the confusion is still further increased.

But why should a scientific writer impose such burdens upon his readers? I refuse to believe that motives of economy force editors to print H. for Hemichroa, or that a man of science begrudges the few extra strokes of the pen necessary to make his published work intelligible. No, it is a mere matter of thoughtless habit, which needs only to be pointed out to be corrected. HERBERT HAVILAND FIELD.

Zurich, Switzerland.

A NEW GENUS OF APHELININÆ FROM CHILE.

BY L. O. HOWARD, WASHINGTON, D. C.

Since the publication of the writer's "Revision of the Aphelininæ of North America" (Bulletin 1, Technical Series, U. S. Department of Agriculture, Division of Entomology, 1895), the discovery of new forms,

and especially of new genera, has been of very infrequent occurrence. Species have been received from all parts of the world, owing to the extraordinary and world-wide development of interest in scale insects, which are the principal hosts of the Aphelininæ, yet nearly all of the forms thus received have been species already described, which have been carried with their hosts upon live plants to many different regions. It is, therefore, interesting to discover a new genus, even from a country like Chile, whose parasitic Hymenoptera are so little known. A most interesting feature of the discovery is that the new genus was reared from *Aspidiotus hederæ (nerii)* together with three of the cosmopolitan forms, namely, *Aspidiotiphagus citrinus* (Craw); *Coccophagus immaculatus*, How., and *Prospalta aurantii*, How. The writer is indebted to Mr. Edwyn C. Reed, of Rancagua, Chile, for this sending, as well as for many other favours.

APHYTIS—New Genus.

Female.—Resembles Aphelinus in the oblique hairless line extending from the stigmal vein transversely to base of wing. It differs principally from Aphelinus in the antennæ, which are only 5-jointed, the first ring-joint apparently being absent. The pedicel is nearly cylindrical; the the first funicle joint cubical; the second funicle joint long oval, wider than the first and more than twice as long; club long, elliptical, longer than pedicel and funicle together. The mesonotal sclerites resemble those of Aphelinus, but the ovipositor is exserted to about one-third the length of the abdomen, as with Centrodora; hind thighs somewhat swollen; stigmal vein is short and knobbed and the post-marginal vein is absent; the mandibles are tridentate; the ocelli large and placed in the form of an oblique angled triangle.

Aphytis Chilensis, n. sp.

Female.—Length to tip of ovipositor 0.94 mm.; expanse 1.8 mm.; greatest width of fore wing 0.18 mm. General colour pale yellow, with slight dusky tinge on the dorsum of the thorax; the lateral margins of the abdominal segments with dusky transverse stripes; antennæ fuscous; wings with a faint dusky cloud below stigmal vein.

Described from 1 female, reared by Edwyn C. Reed, from *Aspidiotus hederæ*, on ivy (presumably *Hedera helix*), Rancagua, Chile.

U. S. N. M., type No. 4968.

SOME NEW GENERA AND SPECIES OF PHYCITINÆ

BY GEO. D. HULST, BROOKLYN, N. Y.

Tetralopha formosella, n. sp.

Expands 18 mm. Head nearly pure white; thorax white with black scales intermixed: fore wings pure white, sometimes intermixed with black, and with black spot on costa to basal line; basal line black, with three long black teeth on outer side; middle field whitish, costa towards base black; along inner margin and reaching half way across wing, dull brick red, broken by median cross scale ridge, which is of intermingled black and white; outer line white, edged on both sides with blackish; outer field grayish, mixed with black, much darker along costa to apex; hind wings fuscous, much darker along outer edge; beneath fuscous on all wings, an outer lighter cross line showing on all wings.

Texas. National Museum type number is 4703.

Mineola scitulella, n. sp.

Of the size and much the appearance of *A. tricolorella*, Grt. It differs in the much more vivid colouring, being thus a much more showy insect, and especially in having the outer cross line edged outwardly with dull red.

Colorado.

Mineola rubescentella, n. sp.

Expands 24–26 mm. Fore wings a smooth reddish gray, the reddish a little more pronounced along costa and about the outer line; a faint reddish spot at middle of base along inner margin; a broad dark red basal cross line, reaching from subcostal vein to inner margin, narrowing towards the latter; discal spots faint, geminate, superimposed; hind wings shining fuscous, marginal line much darker; beneath an even light fuscous.

Tennessee. In appearance very considerably like *Acrobasis rubrifasciella*, Pack. National Museum type number is 4707.

Acrocaula, n. gen.

Palpi of ♂ erect, recurved, rather slender, somewhat long; maxillary palpi small; tongue strong; antennæ with tooth on inner side of basal member as in *Acrobasis*, then bent over basal member, with a slight scale ridge in the bend, the segments beyond this evenly ciliated with hairs on the under side; thorax untufted; abdomen tufted at end; fore wings 11

veins, 4 and 5 separate : hind wings 8 veins, 2 far from angle, 3 separate from 4, 4 and 5 short stemmed, 7 and 8 stemmed. Type *comacornella*, Hulst.

Acrocaula comacornella, n. sp.

Expands 16 mm. Head and antennæ fuscous ; thorax smooth, shining fuscous ; abdomen fuscous, the segments edged posteriorly with whitish ; fore wings dark fuscous, with a broad lighter basal cross band, most distinct at costa, and with a narrow lighter costal patch from discal spot, which it just encloses, to outer line ; outer line very faint ; hind wings transparent fuscous.

Central Texas.

Nephopteryx modestella, n. sp.

Expands 26 mm. Head and palpi light gray, the latter fuscous at tip ; thorax light fuscous ; abdomen whitish, with segments fuscous in front ; fore wings light fuscous gray, with fuscous markings ; the basal and middle field more grayish or whitish, the latter broad at costa, running to a point on inner margin ; a broad fuscous basal band with a faint reddish tinge ; outer field fuscous gray, the outer line whitish dentate, preceded by blackish near costa ; hind wings fuscous, darker outwardly.

Mass.

Salebria Slossonella, n. sp.

Expands 16 mm. Palpi and thorax fuscous ; thorax smooth fuscous ; abdomen dark fuscous, the segments lighter posteriorly ; fore wings gray, consisting of white ground colour, with black scales heavily overlying ; a basal deep red scale ridge followed by a dull rusty yellow band, and this by a black edging ; costa half way of middle field from scale ridge narrowly reddish ; outer line light, not very distinct, close to margin ; hind wings transparent, outwardly fuscous.

Miami, Fla. ; Feb., Mar. From Mrs. Annie Trumbull Slosson, in whose honour the specific name is given. I have the ♀ only, and consequently the generic reference may not be correct.

Salebria afflictella, n. sp.

Expands 14–18 mm. Palpi, front and thorax blackish fuscous ; abdomen fuscous, the end orange ochreous ; fore wings blackish, a purple spot, quite large, along inner border on basal space ; basal cross line broad, whitish, oblique, straight ; middle field in centre, whitish ; outer line fine, whitish, rather strongly bent, dentate ; discal spots geminate, superimposed, black, prominent ; hind wings dark fuscous.

Elizabeth, N. J.; from Mr. Kemp. I have another specimen, a male, from Mr. Kearfott, from Montclair, N. J., which seems to be the same species, but the extremity of the abdomen is fuscous in colour. Both specimens were taken in August, the one from Mr. Kearfott at light.

Salebria nigricans, n. sp.

Expands 20 mm. Palpi and front blackish; thorax in front fuscous, with a purple tinge, blackish gray behind; abdomen light whitish fuscous, with intermingled black scales; fore wings with a white base, heavily overlaid with black scales, giving a clear dark gray appearance; an ochreous tinted spot at middle of basal field; basal line whitish, well out to discal spots; middle field more whitish, owing to fewer black scales; outer line whitish, bent, edged rather broadly with black near costa; hind wings fuscous.

Phœnix, Ariz.; June 1st; from Dr. Kunze. I have the female only, and the generic reference is provisional.

Salebria lacteella, n. sp.

Expands 18 mm. Palpi light ochre fuscous; front white, slightly fuscous stained; thorax light ochre fuscous; abdomen light fuscous, nearly white on two anterior segments; fore wings light gray, stained with reddish ochre along inner margin, in basal field just outside of basal line, and just within outer line, the stain reaching nearly one-half across the wing; basal line blackish, well out, oblique; outer line whitish, bent, with considerable blackish broadly on both sides over middle space; hind wings dull whitish, with a narrow fuscous marginal edging.

Central Texas; female only.

Passadena, n. gen.

Labial palpi horizontal, moderately long, second member heavy, third member small, deflected; antennæ of ♂ bent above base, with a furrow in the bend; fore wings 11 veins, 4 and 5 short stemmed; hind wings 8 veins, cell rather short, 2 at angle, 3, 4 and 5 stemmed, 4 and 5 almost to end. Type *constantella*, Hulst.

Passadena constantella, n. sp.

Expands 16–18 mm. Palpi whitish gray, black on end; front and thorax clear gray; abdomen fuscous to fuscous ochre; fore wings clear white, with black scales more or less thickly intermixed, giving a clear bright gray appearance; basal lines black, geminate, inclosing ground

colour, bent and almost dentate at middle; outer line very oblique, black, heaviest towards costa and beginning well towards apex; with a deep sinus inwardly, then a strongly projecting tooth outwardly at vein 5, then a long reach inwardly, and two teeth before reaching inner margin; hind wings clear white, a fuscous marginal stain, the fringes somewhat fuscous.

Southern California. The insect has considerably the appearance of *Salebria bifasciella*, Hulst, and in some respects is structurally very like *Getulia flavidorsella*, Rag. The genus *Getulia* was founded upon the female only, and *G. institella*, Rag., a West African species, is the type; whether *flavidorsella* or *constantella* are congeneric can not be told till the male is found, but it is almost a certainty that *constantella* at least is not. National Museum type No. is 4704.

Megasis cinctella, n. sp.

Expands 15 mm. Palpi and head fuscous; thorax fuscous, with ochre tint; abdomen ochre fuscous, more fuscous above and lower part of sides; fore wings gray, the veins somewhat broadly and loosely whitish gray; basal line indicated by a dark spot at costa and another at middle of wing; outer line blackish, fine, angled outward at vein 5, then dentate, angled back again at vein 3, edged outwardly with whitish; hind wings transparent, with fuscous margin.

Argus Mts., Cal.; taken by Mr. Koebele, May 31; with the venation of *Megasis*, but while the palpi seem to be as in that genus, there has been distortion of them, and I have the female only; the generic reference is therefore provisional. The National Museum type number is 4705.

Sarata cinereella, n. sp.

Expands: ♂ 32–34 mm., ♀ 26 mm. ♂, palpi long, slender, black towards tip, gray basally; front dull white to gray; thorax light fuscous to blackish gray; abdomen fuscous; fore wings of an even clear light gray, made by a sprinkling of black scales upon a white field; inner line very faintly suggested by a darkening of colour; outer line suggested very faintly by a shade of whitish; hind wings light fuscous, with dark fuscous marginal shading.

♀, palpi blackish; front white; thorax gray, with white and black scales; abdomen fuscous; fore wings dark clear even gray, with two

distinct white cross lines, the basal straight, oblique, heavily edged with black outwardly, the black broadest at costa, the second line scarcely bent, broadly edged inwardly with black; hind wings dark fuscous.

Colorado. Easily distinguished from its congenors by the even colour of the fore wings of the ♂. The ♀ is rather difficult to separate from the other species.

Melitara junctolinecella, n. sp.

Of the size and general appearance of *M. dentata*, Grt., and of the same colour; the outer dentation of the basal line is very much extended, as is the inner dentation of the outer line, so that they meet and join at the centre of the middle field.

Colorado, Texas.

Zophodia epischnioides, n. sp.

Expands about 26 mm. Labial palpi porrect, end member long, somewhat deflexed, middle member heavy, curved, long, sordid gray in colour, white at tip; front strongly cone tufted; antennæ ciliate, subdentate; maxillary palpi small; fore wings rather long, subparallel, rounded at apex, the anterior half gray cervinous, more whitish along costa, the posterior half dull ochre reddish fuscous basally, gradually fading at middle into the colour of the anterior part of the wing; hind wings dark fuscous, broad; beneath, dull fuscous on all wings.

Decidedly like *Epischnia* in appearance, but near *Zophodia*, though not strictly congeneric. The antennæ of the ♂ are flattened and subdentate: veins 4 and 5 of the fore wings are separate, not stemmed as in *Zophodia*, and the tongue is short and stout.

Zophodia fuscatella, n. sp.

Expands about 25 mm. Palpi, front and thorax even dark fuscous gray; antennæ of the male simple, fringed with tufts of hairs, two on each segment; fore wings even fuscous mouse gray, the lines scarcely, if at all, evident; hind wings fuscous, slightly darker on the margin.

Los Angeles, Cal. The National Museum type No. is 4706. The insect differs from the typical *Zophodia* in the structure of the antennæ and in the position of vein 2 of the hind wings.

Euzophera inornatella, n. sp.

Expands 24 mm. Palpi and front fuscous; thorax whitish in front, fuscous behind; fore wings gray, composed of scattered black scales on

a white ground, the white colour being clearer on subcostal vein; two superimposed black spots are just within half the distance out of the wings, one on median, the other on vein 1; outer line suggested by three or four small diffuse blackish spots; marginal line of black dots; hind wings fuscous, marginal line dark fuscous.

Anglesea, N. J.; from Dr. John B. Smith.

Psorosa Texanella, n. sp.

Expands 18 mm. Palpi ochreous; front, thorax and abdomen violet ochre; fore wings ochre, overlaid with blackish fuscous, more prominent along costa, less so in posterior portion; basal space rust red; basal line a broad indeterminate blackish fuscous band; this is followed by a large reddish spot along inner margin, outer line near margin blackish, indeterminate.

Central Texas.

Canarsia gracilella, n. sp

About the expanse of *C. ulmiarrosorella*, Clem.; the wings are narrower than in that species; the ground colour is less clear and darker, and is uniform over the wings; the basal line is obsolete, the outer line faintly evident; discal spots alone are strong, black, coalescent.

Montclair, N. J.; from Mr. Kearfott; taken at light in July and August. This insect appears quite different from *C. ulmiarrosorella* as above, and is a more slender insect.

Selagia australella, n. sp.

Expands 18 mm. Palpi long, slender, fuscous white at end of second and base of third segments; thorax bluish gray; abdomen fuscous gray, darker above; fore wings light gray, composed of white mixed with some black scales, lighter at base and beyond basal lines along inner margin; basal field limited by a fine black line, obsolete at costa, broken dentate, this edged within at middle of wings with white, and followed at middle by a rusty red spot; beyond this two lines, blackish, enclosing white at middle, subparallel, distinctly and quite strongly dentate, reaching across wing; discal spots two, black, superimposed; outer line black, fine, bent and dentate, edged outwardly with white; an interrupted black marginal line; hind wings whitish, margin fine, blackish.

Central Texas. I have the ♀ only.

Honora fumosella, n. sp.

Expands 15 mm. Palpi, front, thorax and abdomen very dark

fuscous, almost a dull black; fore wings almost or quite as dark, with two fine whitish cross lines, the basal straight or nearly so, slanting obliquely outward to inner margin; outer line straight, also slanting outward towards inner margin; a faint whitish cross line on basal area, and a large dull reddish spot between this and the basal line, just posterior to cell; middle space behind cell faintly reddish, hind wings dark fuscous, darker outwardly.

Newark, N. J.; from Mr. Kemp; taken at light, July 23.

Eurythmia Coloradella, n. sp.

Expands 14 mm. Palpi and front blackish fuscous; thorax dark fuscous; abdomen fuscous, lighter coloured towards end, the extreme tip being ochre coloured; front wings dark fuscous, more tinted on posterior part behind cell, and somewhat more strongly on outer field; cross lines very faint and indeterminate; veins on outer field more darkened; hind wings smoky fuscous, darker at margin.

Colorado.

Peoria albidella, n. sp.

Expands about 26 mm. Palpi white, a little fuscous stained; front white; thorax dull fuscous white; abdomen white; fore wings pure white, slightly tinged with fuscous, and with a few scattered dark scales; hind wings the same colour or a little lighter.

Death Valley, Cal.; taken by Mr. Koebele, in April. The type number of the National Museum is 4709.

Urula, n. gen.

Palpi long, crambid-like, porrect or drooping; maxillary palpi small; tongue nearly obsolete; antennæ of ♂ not bent above base, dentate, with tufts of hairs on each segment; antennæ of ♀ simple; front with a strong conical tubercle, horizontally edged at apex; fore wings 11 veins, 4 and 5 separate, 10 from cell; hind wings 7 veins, 2 distant from angle of cell, 3 and 4 from a point, 8 short stemmed with 7. Type *incongruella*, Hulst.

Urula incongruella, n. sp.

Expands 18–21 mm. Palpi ochre to whitish; thorax whitish to ochre fuscous; abdomen fuscous to gray, ochre tinted on two anterior segments; fore wings ochre to light gray, strongly mixed with dark scales from subcostal to vein 1, and reaching from base to outer line; inner line whitish, rather broad, rounded; outer line whitish or ochreous, oblique, sinuous, the wings being darkest just before it; outer field grayish to

russet ochre ; a black spot along costa, just beyond outer line ; margin blackish ; discal spots faint, joined by a circular russet ochre spot ; hind wings light fuscous, marginal line dark fuscous ; all fringes ochre to gray, interlined with dark fuscous.

Argus Mountains, Cal.; taken by Mr. Koebele, in April.

Phœnix, Ariz.; taken early in June. National Museum type number is 4708. The insect has very strongly the appearance of *Lipographis leoninella*, Pack.

Aurora nigrocinereella, n. sp.

Expands 17–19 mm. Palpi, front and thorax clear blackish gray ; abdomen fuscous ; fore wings broad, clear light gray, overlaid more or less with black scales, but the whitish showing as edges of basal line, also within outer line, becoming very broad at costa, also as outer edge of outer line, and on submarginal space ; lines black, fine, rather clear ; basal strongly angulate wavy ; outer angulate sinuous ; marginal line of blackish spots ; hind wings smoky white, with dark margin.

Texas ; taken July 7. The type number of the National Museum specimen is 4710.

Maricopa albocostella, n. sp.

Expands 16–18 mm. Palpi blackish ; thorax smooth bluish gray ; abdomen ochre fuscous ; fore wings, anterior one-third whitish with a vinous tint, somewhat mixed with dark scales, the rest of the wing wine fuscous, the vinous colour being strongest close to inner margin ; discal spots large, black ; hind wings fuscous, margin blackish.

Anglesea, N. J.; from Dr. John B. Smith ; taken Aug. 21 to 24.

Myelois dulciella, n. sp.

Expands 14 mm. Palpi and front dark fuscous ; thorax light fuscous ; abdomen fuscous, interlined with light fuscous, the first two segments gray fuscous ; fore wings of a clear light blue-gray colour ; lines fine, black, distinct, the basal rounded, bent, reaching well out on inner margin, broken at subcostal vein ; within this line, nearer inner margin, is a large rounded reddish spot, and this is edged basally, and rather heavily, with black ; outer line heaviest at costa, strong, bent, angulate ; outer field with a reddish band next to outer line ; marginal line of black dots ; discal spots black, distinct, superimposed ; hind wings light smoky colour, veins and margin somewhat darker.

Hastings, Fla.; from Mr. Kearfott ; taken Oct. 26.

TENTHREDO—NEW SPECIES.*

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

1. Antennæ black..... 2.
   Antennæ rufous :
   Black, with the following parts rufous : the antennæ, a spot on the cheeks, the tegulæ, the wings, especially at base, and the front and middle femora, on the femora shading to blackish ; with the following parts yellow : the clypeus, the labrum, the mandibles except at apex, the scutellum, the trochanters, the tibiæ, except the apices of the posterior pair which are brownish, the tarsi, the sides and a narrow margin to the basal plates, and a spot above the posterior coxæ ; the clypeus broadly emarginate ; the third segment of the antennæ twice as long as the fourth ; the front flat between the antennæ. Length, 11 mm. Habitat—Amherst, Massachusetts (Prof. C. H. Fernald)..... *Fernaldii*, n. sp.
2. Head more or less yellow above the base of the antennæ..... 3.
   Head black above the base of the antennæ..... 4.
3. Posterior femora black above :
   Greenish-white, with the following parts black : the antennæ, a five-lobed spot on the vertex, three of the lobes being above the base of the antennæ and another at each meso-caudal angle of the eye, the back of the head, a transverse band on the pronotum, the median lobe of the mesonotum except the V-spot, the lateral lobes except a minute dash on their cephalic half, the metathorax except its scutellum and the posterior part, an oblique band on the suture between the mesopleura and the metapleura, a four-lobed spot on the disc of the basal plates, a fuscous spot on each side of the meson of the first tergal segment, the caudal margin of the metapleura, the bases of the coxæ, and the middle and posterior femora above; the wings are very slightly fuscous, the apex of the stigma and the veins black, the costa yellowish and distad of the stigma greenish ; the clypeus squarely emarginate ; the third segment of the antennæ one-third longer than the fourth ; the posterior legs beyond the femora and the abdomen beyond the third segment

*See Journ. N. Y. Ent. Soc., V., 1897, 103–108, where the remaining species that I have described are arranged analytically.

rufous. Length, 11 mm. Habitat—Ithaca, New York (R. L. Junghanns)..... *causatus*, n. sp.

Posterior femora rufous :

Yellowish, with the following parts black : the antennæ, a spot on the vertex with narrow lateral dilations along the caudal margin of the head, the apices of the mandibles, two narrow parallel dorso-ventral lines on the caudal aspect of the head, a transverse band on the pronotum, a spot on the median and lateral lobes of the mesonotum, the suture between the mesonotum and metanotum, a lobate spot on the disc of the basal plates, a spot on each side of the meson of the first abdominal segment, a dot at the base of the middle femora, a spot on the posterior coxæ and each segment of the posterior trochanters and another at the base of posterior femora ; the abdomen and the middle and posterior legs rufous ; the wings hyaline, the veins and the stigma black except the base of the stigma and the costa, which are pale ; the clypeus squarely truncate ; the third segment of the antennæ one-third longer than the fourth. Length, 12 mm. Habitat—Ithaca, New York (R. L. Junghanns)..*rubripes*, n. sp.

4. Abdomen in part pale..... 5.
Abdomen wholly black..... 16.

5. Pleura with a light spot..... 6.
Pleura not with a light spot, black..... 8.

6. Pectus pale..... 7.

Pectus black :

Black, with the following parts yellowish : the clypeus, the labrum, the mandibles except at apex, the cheeks, the tegulæ, the collar, the ventral margin of the pronotum, a line on the pleura, a spot above the posterior coxæ, the basal plates except at middle, the suture between the mesopleura and metapleura, the front and middle legs except a black line above which reaches to the apices of the tibiæ, the posterior coxæ except a black spot above and beneath, the posterior trochanters except above, the posterior femora and tibiæ except above, and with the black greatly dilated at the apices of each of the segments ; the posterior tarsi black except the apical segment ; the abdomen rufous except the first tergal segment ; the wings slightly

infuscated; the veins, including the costa and the stigma, black; the clypeus widely emarginate; the third segment of the antennæ about one-fourth longer than the fourth. Length, 12 mm. Habitat—Ithaca, New York (R. L. Junghanns). . . . . *Junghannsii*, n. sp.

7. Posterior tibiæ in great part and tarsi, black:

Black, with the following parts yellowish: the clypeus, the labrum, the mandibles except at apex, the cheeks, the collar, the tegulæ, the ventral portion of the pleura, the pectus, a spot above the posterior coxæ, the coxæ and trochanters except a black line above, the anterior femora and tibiæ except a narrow black line above, and the anterior tarsi; the following parts rufous: the middle and posterior femora except a black line above, the middle tibiæ except an elongate spot above at apex, the middle tarsi except a black line above, the posterior femora except a black line above, the posterior tibiæ except the apical three-fourths, the sternal abdominal segments as far as the seventh, and the tergal segments two to five; the wings are very slightly infuscated; the veins brownish; the stigma and costa black; the clypeus squarely truncate; the third segment of the antennæ one-third longer than the fourth. Length, 11 mm. Habitat — Franconia, New Hampshire (Mrs. Annie Trumbull Slosson). . . . . *Slossonii*, n. sp.

Posterior tarsi and tibiæ rufous:

Black, with the following parts yellowish: the clypeus, the labrum, the mandibles except at apex, the cheeks, the sides of the basal plates, and a spot above the posterior coxæ; the following parts rufous: the collar, the tegulæ, the pleura, the pectus, the legs except a black line above on the coxæ, trochanters, and femora, and the abdomen, including the venter; the wings are hyaline; the veins, including the costa and the stigma, luteous; the clypeus roundly emarginate; the third and fourth segments of the antennæ subequal in length. Length, 10 mm. Habitat—Washington (Prof. C. V. Piper). . . . . *sicatus*, n. sp.

8. Pectus pale. . . . . *rufostigmus*, MacG.

Pectus black. . . . . 9.

9. Posterior femora wholly pale. . . . . 10.

Posterior femora wholly or in great part black. . . . . 13.

10. Cheeks marked with white. ..... 11.
Cheeks black. ..... *atravenus*, MacG.

11. Scutellum and legs yellow :

Black, with the following parts yellowish-white : the clypeus, the labrum, the mandibles except at apex, the cheeks, the palpi, the tegulæ, a large spot on the collar, a spot above both the anterior and posterior coxæ, the apices of the coxæ, the legs beyond the coxæ (some of the tarsal segments are slightly rufous), the scutellum, the basal membrane, the basal plates, tergal segments one to four except a black line on their middle at base, the sides of segments five and six, and a narrow margin on the sides of those ventral segments whose tergums are wholly or in part pale ; the clypeus squarely emarginate ; the third segment of the antennæ one-third longer than the fourth ; the wings hyaline, yellowish ; the veins brown ; the costa and the stigma at base, luteous. Length, 12 mm. Habitat—Olympia, Washington (Trevor Kincaid). ..... *olivatipes*, n. sp.

Scutellum black, the legs rufous. ..... 12.

12. Tegulæ yellowish-white ; abdomen rufous beyond the third tergal segment. ..... *aequalis*, MacG.

Tegulæ rufous ; abdomen rufous beyond the first segment :

Black, with the following parts yellowish : the clypeus, the labrum, the mandibles except at apex, a lunate mark on the cheeks, a triangular spot between the antennæ sometimes absent, the collar, and a spot above the posterior coxæ ; the following parts rufous : the tegulæ, the legs except the bases of the coxæ and the sutures of the trochanters, the venter of the abdomen except the sheaths of the ovipositor, and the tergal abdominal segments beyond the first ; the wings infuscated, the veins and stigma black, the costa rufous : the clypeus squarely emarginate ; the third segment of the antennæ one-third longer than the fourth. Length, 12 mm. Habitat—Olympia, Washington (Trevor Kincaid) ..... *lunatus*, n. sp.

13. Posterior tibiæ in part pale. ..... 15.
Posterior tibiæ black ..... 14.

14. Posterior femora wholly black ..... *remotus*, MacG.
Posterior femora rufous, with a black line above :

Black, with the following parts yellow: the labrum, the clypeus, the mandibles except at apex, a spot on the cheeks, a spot on the collar, the tegulæ, a spot above the posterior coxæ, the anterior legs, including the coxæ, before, the middle coxæ and trochanters beneath, the knees of the middle legs beneath, and the middle tibiæ and tarsi beneath; the following parts rufous: the middle femora beneath, the posterior femora except a spot at the base and apex above, the posterior tarsi, and the abdomen beyond the third segment; the third segment of the antennæ one-third longer than the fourth; the clypeus deeply emarginate; the wings hyaline, yellowish; the veins black; the costa reddish; the stigma luteous at base. Length, 10 mm. Habitat—Grangeville and Lewiston, Idaho (Prof. J. M. Aldrich) ..... *rubrisommus*, n. sp.

15. Spot above the posterior coxæ and the sides of the basal plates yellow..... .....**terminatus*, MacG.

Spot above the posterior coxæ wanting and the sides of the basal plates black:

Black, with the following parts rufous: the front femora except a black line above interrupted at middle, the middle and posterior except a black line above, the tibiæ except a black spot on the apex of the posterior pair, more pronounced beneath, the front tarsi, the apical two-thirds of the first abdominal segment except a black line at apex, abdominal segments two to five, a diamond-shaped mark on the middle of the sixth tergal segment, and the ventral abdominal segments two to five; the clypeus squarely emarginate; the third segment of the antennæ one-third longer than the fourth; the mandibles yellowish-white except at apex; the wings fuliginous; the veins, including the costa and the stigma, black. Length, 11 mm. Habitat—Olympia, Washington (Trevor Kincaid) ..*nigricoxi*, n. sp.

16. Legs black varied with white or yellow..... 17.

Legs rufous varied with black..... ..20.

17. Posterior tibiæ black..... .....18.

*A specimen received from Prof. C. V. Piper, and collected at Pullman, Washington, was given the manuscript name terminoidea, but on more careful study it does not seem to differ from terminatus.

Posterior tibiæ wholly or in part pale ..... 19.

18. Tegulæ and sides of basal plates black..... *pallipunctus*, MacG.

Tegulæ and sides of basal plates pale:

Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, a triangular spot each side of the collar, a spot on the tegulæ, a spot above the posterior coxæ, the sides of the basal plates, the under side of the anterior femora, tibiæ and tarsi, and the under side of the middle tibiæ and metatarsi; the clypeus squarely emarginate; the third segment of the antennæ twice as long as the fourth; the wings infuscated; the veins brownish, the stigma and costa black. Length, 13 mm. Habitat—Olympia, Washington (Trevor Kincaid)..... *alphius*, n. sp.

19. Posterior tibiæ wholly pale:

Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, the palpi, a spot on the collar, the tegulæ, the basal membrane, the sides of the basal plates, a spot above the posterior coxæ, and all the legs beyond the coxæ (the legs become flavescent at apex) except a spot on the apex of the middle and posterior femora above; the clypeus squarely emarginate; the third segment of the antennæ twice as long as the fourth; the wings hyaline, flavescent at base; the costa and the base and the apex of the stigma flavescent; the stigma at middle and the veins brown. Length, 14 mm. Habitat—Vancouver Island (Carl F. Baker)..... *subcoerulea*, Es.

Posterior tibiæ black above, pale beneath:

Black, with the following parts whitish: the clypeus, the labrum, the mandibles except at apex, a spot on the cheeks, a line on the collar, the tegulæ, a spot above the posterior coxæ, the front legs beneath, including the coxæ, the middle legs beneath beyond the trochanters except the tarsi beyond the metatarsi, a line on the apex of the posterior femora beneath, the posterior tibiæ beneath, the basal segment of the posterior tarsi beneath, a spot on the apex of the middle and the posterior coxæ, and a spot on the sides of the basal plates; the third segment of the antennæ one-fourth longer than the fourth: the clypeus squarely emarginate; the wings hyaline; the veins, including the costa and the

stigma, black. Length, 9 mm. Habitat—Juliaetta and Craig's Mt., Idaho (Prof. J. M. Aldrich)..... *atracostus*, n. sp.

20. Posterior femora in part black:

Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, a small spot on the cheeks, a line on the collar, the tegulæ, a spot above the posterior coxæ, the front legs beneath, the knees of the middle and posterior legs beneath, and the middle and posterior tibiæ beneath; the following parts rufous: the front femora behind and at middle, the middle femora beneath and at middle above, and the posterior femora except a linear spot on the base and apex above; the third segment of the antennæ one-fourth longer than the fourth; the clypeus broadly emarginate; the wings hyaline; the veins, including the costa and the stigma, black. Length, 8 mm. Habitat—Juliaetta, Idaho (Prof. J. M. Aldrich) .... *Aldrichii*, n. sp.

Posterior femora rufous..... 21.

21. Tegulæ and collar black..... 22.

Tegulæ and collar pale..... 23.

22. Yellow spot above the posterior coxæ..... *nigrisommus*, Harrg.

Yellow spot above the posterior coxæ wanting.. *erythromerus*, Prov.

23. All the tibiæ rufous..... *ruficollis*, Harrg.

Anterior tibiæ black above..... 24.

24. Posterior tibiæ wholly rufous:

Black, with the following parts yellowish-white: the clypeus, the labrum, the mandibles except at apex, a small spot on the cheeks, a spot on the upper posterior angles of the prothorax, the tegulæ, a spot on the ventral margin of the pronotum, a spot above the posterior coxæ, a spot on the sides of the basal plates, a fine line on the posterior margin of the basal plates, a spot on the anterior coxæ beneath, a small spot on the posterior coxæ above near the apex, and the front and middle legs beneath (in some specimens the middle femora are wholly rufous and in some the coxæ are pale at apex); the legs beyond the trochanters rufous except a black line above on the anterior and middle tibiæ (in one specimen the black line on the middle

tibiæ is only represented by a black dash), and the middle and posterior tarsi above (in one specimen there is a triangular shaped black spot on the anterior tibiæ above); the clypeus deeply and roundly emarginate; the third segment of the antennæ one-third longer than the fourth; the wings hyaline; the costa and the stigma fuscous, the former paler at base. Length, 12 mm. Habitat—Olympia, Washington (Trevor Kincaid)..... *nigrifascia*, n. sp.

Posterior tibiæ rufous, with a black line above:

Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, a spot on the collar, the tegulæ, the tibiæ beneath, and a spot above the posterior coxæ; the remainder of the legs rufous except the following: a black spot on the base and apex of the femora (more pronounced on the anterior pair), a black line on the front and middle tibiæ and tarsi above, the posterior tibiæ above, and the posterior tarsi entirely; the clypeus emarginate; the third segment of the antennæ one-third longer than the fourth; the wings hyaline; the veins, including the costa and the stigma, black. Length, 9 mm. Named after Mr. William Allen Savage. Habitat—Juliaetta, Idaho (Prof. J. M. Aldrich)..... *Savagei*, n. sp.

The University of Illinois has fallen heir to the Bolter Collection of Insects, numbering approximately fifteen thousand species, represented by about seventy thousand specimens, besides thirty thousand duplicates not in the systematic collection. This collection, accumulated during the last fifty years by the late Andreas Bolter, a business man of Chicago, is remarkable for the excellence of the material and for the exquisite care with which it has been prepared and arranged. It represents all orders of insects and North America in general, and contains also a considerable amount of exotic material. The gift was made by the executors of Mr. Bolter, in accordance with the terms of his will, conditional upon its maintenance as a unit, under the name of the "Bolter Collection of Insects," and in a fireproof building.

The Entomological Society of Ontario has been placed under obligation to Mr. C. T. Ramsden, of Santiago de Cuba, for the gift to its collection of a specimen of the strange genus *Ascalaphus*, in the *Myrmeleonidæ*, which is in itself a great curiosity, as well as being scientifically valuable.

J. Alston Moffat, Curator.

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 2.—Continued from page 155.)

Subfamily I.—Pepsinæ.

To this subfamily belong the giants of the family, although many species in it are of moderate or insignificant size. Here belong the "Tarantula Killers," or Pompilids, belonging to the genus *Pepsis*, large, brilliantly-coloured species, often with fiery red wings, or blue or black wings marked with white or red, etc., that prey upon the genuine Tarantulas and other large species of spiders.

The species belonging to this group are at once distinguished from all others, except the *Agenioinæ*, by *the second ventral segment in both sexes* being traversed by a *transverse grooved line, impression or emargination*. This transverse grooved line, or emargination, is present in *no* other group, except in the females belonging to the *Agenioinæ*, but these are readily distinguished by their smooth hind tibiæ, which are always simple, *without teeth or spines* and *without* a longitudinal ridge. In the Pepsinæ the hind tibiæ in the females are most frequently toothed or serrate, as well as distinctly spinous; but very rarely simple, *without* teeth or spines, but in the few genera without these characteristic features the hind tibiæ have a longitudinal ridge or carina, not possessed by the *Agenioinæ*.

Table of Genera.

Second cubital cell receiving the first recurrent nervure *much before* the middle, or near its basal angle.... .....2.

Second cubital cell receiving the first recurrent nervure, *at* or *beyond* the middle, very rarely *a little* before the middle. .....3.

2. Wings ample, extending far beyond the tip of the abdomen; second cubital cell larger than the third

Hind tibiæ in ♀ strongly serrated; ocelli placed in an obtuse triangle; mandibles bidentate; maxillæ normal; hind tibiæ in ♂ simple, *not* serrate, the tarsi compressed, flat, the basal joint usually curved or bent; fourth or fifth ventral segments with long bristles, often in two groups; claws with a tooth before middle..... ....(1) Pepsis, Fabr.

(Type P. ruficornis, Fabr.)

Hind tibiæ in ♀ smooth or nearly; ocelli triangularly arranged; mandibles 4-dentate; maxillæ at base with two long divergent brushes of pale hairs; claws with a median tooth beneath.....(2) Dipogon, Fox.
(Type D. populator, Fox.)

Wings much abbreviated; *not* extending to tip of abdomen; second cubital cell smaller than the third; submedian cell longer than the median; cubitus in hind wings originating beyond the transverse median nervure; claws with one tooth beneath.....(3) Sphictostethus, Kohl.
(Type P. Gravesii, Hal.)

3. Submedian cell in front wings *not* longer than the median or *clearly* shorter, the transverse median nervure interstitial with the basal nervure, or uniting with the median vein *before* the origin of the basal nervure.....9.

Submedian cell in front wings distinctly *longer* than the median, the transverse median nervure uniting with the median vein *beyond* the origin of the basal nervure.

Marginal cell pointed at apex; claws *not* cleft, but with one tooth beneath; inner angle of first discoidal cell *without* a glabrous spot at base, or only faintly indicated.....7.

Marginal cell broadly rounded, or squarely or obliquely truncate at apex; inner angle of first discoidal cell *with* a distinct glabrous spot at base (rarely wanting).....4.

4 All claws cleft, or *with* one or more teeth beneath.....5.

Front claws alone cleft, the others with a tooth beneath.....(4) Heteronyx, Sauss.

5. Marginal cell scarcely thrice as long as wide, the first recurrent nervure received by the second cubital cell beyond the middle or towards apex, but considerably *before* the second transverse cubitus; claws cleft.....6.

Marginal cell very long, four times, or nearly, longer than wide; first recurrent nervure interstitial, or *very nearly*, with the second transverse cubitus; inner angle of first discoidal cell usually with a glabrous spot; cubitus in hind wings originating before the transverse median nervure (rarely interstitial).

Claws with *one* tooth beneath; outer ridge on hind tibiæ in ♀ distinctly serrate, the face with short, stiff bristles.....(5) Mygnimia, Shuckard.
(Type M. flava, Fabr.)

Claws with *two* teeth beneath in ♂ cleft; metanotum with a tubercle on each side of the spiracles, otherwise as in *Mygnimia*..... (6) Hemipepsis, Dahlb.
(Type H. capensis, Dahlb.)

Claws with *four* teeth beneath and closely and longly combed with bristles; outer ridge on hind tibiæ in ♀ simple, not at all serrate (Africa)..... (7) Tetraodontonyx, Ashm., n. g.
(Type T. rufipes, Ashm., m. s.)

6. Front tibiæ spined above, the front tarsi with a long comb, consisting of 7 or 8 long spines; hind tibiæ and tarsi armed with large spines. Second and third cubital cells small, the third the smaller of the two..... (8) Schiztonyx, Sauss.

Front tibiæ not spined above, the front tarsi armed with short spines; hind tibiæ and tarsi armed with small spines arranged in rows; second and third cubital cells large, the third the larger of the two..... (9) Cyphononyx, Dahlb.

7. First recurrent nervure received by the second cubital cell *at*, near, or a little beyond the middle, but rarely as far as its apical third, the second recurrent nervure received by the third cubical cell before its middle..... .8.

First recurrent nervure received by the second cubital cell *near* its apex, or at or beyond the apical third; submedian cell much longer than the median; wings ferruginous, margined with black; cubitus in hind wings interstitial with the transverse median nervure..... (10) Pallosoma, Lepel.
(Type P. barbara, Lepel.)

8. Cubitus in hind wings *interstitial* or originating a little before the transverse median nervure; eyes *not*, or only slightly, convergent above; clypeus with the anterior margin more or less distinctly sinuate medially (rarely truncate), the labrum slightly exposed.

Front tarsi *with* a comb; hind tibiæ in ♀ strongly serrate, in ♂ with short, indistinct spines; second cubital cell receiving the first recurrent nervure near its apical third..... (11) Salius Fabricius.
= Priocnemis, Schiödte (pars).
= Priocnemoides, Sauss.

Front taris *without* a comb; hind tibiæ in ♀ *not* serrate, or with only slight traces of teeth, but with some short, stout spines, in ♂ *without* or at most with very short, feeble

spines; second cubital cell receiving the first recurrent nervure at or only a little beyond its middle.....(12) Calopompilus, Ashm., n. g.
(Type P. maculipennis, Smith.)

Cubitus in hind wings originating *beyond* the transverse median nervure, or at least somewhat beyond it, never interstitial; clypeus squarely truncate anteriorly; second cubital cell receiving the first recurrent nervure *at* or a *little before* its middle.....(13) Hemipogonius, Sauss.
(Type H. venustipennis, Sauss.)

9. Submedian and median cells in front wings equal the transverse median nervure, *interstitial* with the basal nervure.
Pronotum as long or longer than the mesonotum .....11.
Pronotum distinctly shorter than the mesonotum.....10.

10. Eyes convergent above; pronotum anteriorly abruptly truncate; first recurrent nervure joining the second cubital cell a little beyond the middle; claws with a tooth beneath; cubitus in hind wings interstitial.....(14) Calicurgus, Lepel.
(Type C. fasciatellus, Lep.)

11. First recurrent nervure received by the second cubital cell *at* or *near* its middle; cubitus in hind wings interstitial, or nearly, with the transverse median nervure.....(15) Ferreolomorpha, Ashm, n. g.
(Type Priocnemis pedestris, Smith.)

THE GENUS CATOCALA.

BY G. H. FRENCH, CARBONDALE, ILL.

It is 16 years since the Rev. G. D. Hulst undertook a revision of this genus along the lines of "Structural Characters." As a new Check List of the moths is to be published soon, it seems proper that another arrangement of the genus be made. The structure of the genitalia as a basis of the separation of the species has been regarded by many eminent lepidopterists as of doubtful value. It is certain that in this genus its use was not warranted by larval characters or field observation. For these reasons the last revision has not been satisfactory to those who were familiar with many species in their native haunts, or who had bred them. The writer does not say, however, that the present revision will be faultless, for as yet too few of the species are known in their adolescent stages

to make this much of an aid in classification. It is now a question whether certain forms are valid species or mere varieties, and this can be settled only by further observation or breeding. Many species have a wide range of variation, such as Lacrymosa, but the intergrades and varieties in this species are all well known, and the characters are so strongly marked in all the forms that we need not hesitate with this species. Other species, as Epione and Sappho, are remarkably uniform in their markings, even when from widely-separated localities. Of the validity of these species there is no question, even without breeding. Of some of the others, it seems better to retain their names as species till they are proven otherwise. The closet naturalist is not always able to judge in such cases. Even so good a botanist as Dr. Asa Gray was led astray in at least one instance known to the writer by not knowing his plant in the field.

In regard to sequence, there seems to be no reason why the smaller species should be regarded as the highest. If activity counts for anything, then *Epione* certainly stands at the head of the list. Unless we change the usual generic description, *Allotria Elonympha, Andrewsia Belfragiana* and *Parthenos Nubilis* are not Catocalæ.

In the December number of the Canadian Entomologist for 1892, page 308 of Vol. 24, it was shown that too little was known of the larvæ to use them as a basis of classification in this genus. As a rule they are striped longitudinally, but one species, *Illecta*, has its larva striped transversely. Generally there is a lateral fringe along the sides of the larvæ, but three species, *Obscura*, *Innubens* and *Illecta*, were known not to have this fringe, 15 species having it. As these differed widely in size, colour and markings of the imagines, this character would be of little value in classification. For this and other reasons it seems best to follow the general practice and take the colour of the hind wings as the basis of division of the genus into groups. In this paper the writer will consider only the black-winged species.

As to the two species, *Viduata* and *Vidua*, we see no good reason for relegating the former to synonymy. There are numerous instances where names in the same genus in our catalogues are the same except for a slight difference in the termination. From Kirby's Catalogue of the Diurnal Lepidoptera we have *Anthocaris Ausonia* and *Ausonides*, and *Papilio Xuthus* and *Xuthulus*, and a number of others might be cited. In his Catalogue of the Heterocera, Vol. 1, published in 1892, we find Kirby

following the same practice: as *Amorpha Populi* and *Populeti*, *Miltochrista Rosaria* and *Rosacea*, etc. It is also not a very uncommon thing to see the same name used in a family in related genera without any change. As an instance of this, in Dr. Skinner's new catalogue of "North American Rhopalocera," 1898, we find *Diadema Misippus*, and in the next genus *Limenitis Misippus*. In these species the female of the first is coloured and marked so much like the second in both sexes that they might easily be mistaken for each other by an amateur. Yet the writer has seen no criticism on Dr. Skinner's course in the use of these names. The same thing was found in a catalogue of Star Fishes, where the specific name *Miliaris* was used in two related genera of the same family. However much we may regret that names with only a slight difference in termination have been used, or the same name for two species in related genera of a family, when the names have been published and used it seems best to the writer to let them alone. Indeed, I do not believe any one has a right to change them. In the case before us there is no danger of confounding *Viduata* and *Vidua*, for the two insects are very different.

In regard to the two names, *Judith*, Strecker, and *Levettei*, Grote, the dates of the published papers in which the descriptions occur give Strecker's name the priority. We have decided to take the "face of the returns" as evidence in this case without taking up the differences of the two authors.

In looking over the collection of Dr. William Barnes, of Decatur, Ill., a new species was found which the Doctor kindly placed at my disposal. In the description that follows, the writer has dedicated the species to its owner by the use of his name for the species.

Catocala Barnesii, nov. spec.

Expanse, 2.63 inches. General or ground colour of the fore wings rather dark olive gray, not so dark as that of *Obscura*, but between that species and the colour of *Robinsonii*, the lines faint and much the same as they are in the latter species, the insect in general reminding one of *Robinsonii*, but it is smaller and darker, standing in size between *Robinsonii* and *Judith*. Comparing the markings with those of *Robinsonii*, the t. a. line is oblique, reaching the posterior margin close to the t. p. line as in *Robinsonii*, but the costal portion is heavier; the shade over the reniform is rather heavy; the reniform with only the inner part of its ring visible This portion black, the rest concolorous, while in *Robinsonii* the reniform is brown; subreniform whitish, closed or nearly so, in colour paler than in *Robinsonii*, and in that species it is wide open; t. p. line

with its two extra-discal teeth about half as acuminate as in *Robinsonii*, in the latter the anterior often extends across the subterminal space; s. t. line scarcely discernible, much less brown in the s. t. space than in its ally, almost concolorous. The ground colour of *Robinsonii* is pale gray with a slight bluish sheen as seen in its side light, that of *Barnesii* has a slight purplish sheen in a side light.

Hind wings black, fringe white with a slight ochraceous tinge at base, black at the ends of the veins. The under side as in *Robinsonii*, but more smoky in tinge.

Described from two examples from San Antonio, Texas; in the cabinet of Dr. Wm. Barnes, Decatur, Ill.

The writer would arrange the black-winged species of the Catocalæ of the United States as follows :

Catocala, Schrank.
1. Epione, Drury.
2. Sappho, Strecker.
3. Agrippina, Strecker.
4. Subviridis, Harvey.
5. Lacrymosa, Guenée.
   var. Ulalume, Strecker.
   var. Paulina, Hy. Edw.
   var. Emilia, Hy. Edw.
   var. Evelina, French.
   var. Zelica, French.
6. Viduata, Guenée.
   Maestosa, Hulst.
7. Vidua, A.-S.
   Desperata, Guenée.
8. Dejecta, Strecker.
9. Retecta, Grote.
   var. Luctuosa, Hulst.
10. Flebilis, Grote.
11. Robinsonii, Grote.
    var. Curvata, French.
12. Barnesii, French, nov. sp.
13. Obscura, Strecker.
    var. Simulatilis, Grote.
14. Residua, Grote.
15. Insolabilis, Guenée.
16. Angusi, Grote.
    var. Lucetta, Hy. Edw.
17. Judith, Strecker.
    Levettei, Grote.
    var. Miranda, Hy. Edw.
18. Tristis, Edw.
19. Elda, Behrens.
20. Relicta, Walker.
    var. Bianca, Hy. Edw.
    var. Phrynia, Hy. Edw.

A NEW CATOCALA FROM TEXAS.

BY A. RADCLIFFE GROTE, ROEMER MUSEUM, HILDESHEIM, GERMANY.

Catocala moderna, n. sp.

Allied to *C. viduata*, Guenée, but very much smaller, and at once distinguished by the pale ochreated band of the under surface of hind wings reflecting through on upper surface, where it appears as a faintly yellowish mesial shade, distinctly outlined. Fore wings like *C. viduata*, of the same pale gray, with the black oblique shading running from costa at centre of median space outwardly to below apices, less marked than

in its ally. Subreniform paler, more yellowish. Else the lines and markings copy in miniature its ally. Fringe to secondaries white. Collar darker, with black line ; thorax pale gray.

Expanse 70 mil. *Hab.*—Dolores, Texas.

Accompanying the fresh type are examples of *C. viduata*, Guen. (*maestosa*, Hulst. Guenée considered his name sufficiently distinct from *vidua*, and adopted it for that reason), which expand 95–98 mil. I know of no black-winged *Catocala* in which the mesial band shows so plainly.

In this same collection is a fresh ♀ example of *Eacles imperialis*, var. *nobilis*, Neum., with the wings all suffused with russet ; also one of var. *didyma*, Beauv., not recorded by Dyar. Yellow, with both wings terminally entirely russet, outside of the undulate pale purple band. My recollection of the work of De Beauvois is that he figures this form. The antennæ in the figure are incorrect; from having been broken off his type, the author was induced to effect a restoration in his figure not agreeing with reality. There is also a larva of a *Citheronia*, which does not well agree with alcoholic specimens of *C. regalis*, and may be *C. Mexicana*.

BOOK NOTICE.

Stories of Insect Life (Second Series).—By Mary E. Murtfeldt and Clarence M. Weed. Ginn & Co., pp. 72, 1899.

Reliable books about insects, written so that children can understand them and will be interested, are few in number. The little work now under consideration fulfils its purpose admirably, and will doubtless be very useful in fostering a taste among children for insect life. The information given is accurate and well selected. Moreover, it is presented in an earnest, attractive manner, which will create a desire for more knowledge, and, with that desire, an inclination to seek for it where best it can be found, in the open field, by personal observation. The present booklet is intended as a companion to a similar publication of 54 pages, which appeared last year. Both are well and freely illustrated. The insects chosen for description are common objects of the country, just such as a child would wish to know about. The aim of the authors was well conceived, and has been well carried out. They say : "This little book is designed for use as a reading book, which shall lead the pupil to fuller observation upon the insects about him. It is not essential that the articles be read consecutively ; but it is highly desirable that the pupils actually see as many as possible of the insects discussed." "The study of living insects should always have the first place in school work. The aim of the teacher should be, not to foster the collecting spirit so much as to develop the perceptive faculties in such a way that the pupil will not only notice the things about him, but will be on the alert for the significance of their structure, their colour or their habits of life." J. F.

Mailed May 31st, 1900.

(See page 139.)

The Canadian Entomologist.

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THE "ENTOMOLOGICAL MUDDLE"—A REJOINDER.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

I thought I had "said my say" on the Cunea-Congrua question, but Mr. Lyman's attack upon me demands a reply.

Mr. Lyman has made a military allusion in rather questionable taste. I would remind him that the reason the Boers have *stuck to their guns* is that, until now (May, 1900), their opponents have not been able to capture their guns, but have, on the other hand, furnished the Boers with new artillery and fresh stores of ammunition.

Mr. Lyman has supplied me with new proofs that *cunea*, Drury, and *punctatissima*, S. & A., are not identical—proofs that I think will be convincing to every candid reader. I shall set them forth in due course.

I will arrange the remarks I have now to offer as I did those which I made in the March number of this year's ENTOMOLOGIST.

I.—Concerning the identity of *congrua*, Walker, with *antigone*, Strecker.

Mr. Lyman thinks it probable that I am right in maintaining that *antigone*, Strecker, is only a synonym of *congrua*, Walker; but he thinks also that two clauses in my summary of evidence brought before us—viz.:

(c) Dr. Hulst and others have bred it.

(d) S. antigone has been found to be identical with it—"too positive to be scientific." Why? Dr. Hulst described the larvæ under the name of *congrua*, and the larvæ I raised were unquestionably of the same kind as his, and these produced moths which tally in every particular with the description given by Grote and Robinson (see description on page 123 of the May number), several of them having the S-like mark

which Mr. Lyman has never seen; and this description was made by Grote from two of Walker's types which he saw and handled, and which bore Walker's own identification marks; and Messrs. Dyar and Beutenmuller have declared the moths, raised as above mentioned, to be identical with *S. antigone*, Strecker; and Walker's name of the species has the priority. What more would Mr. Lyman have? Does he think we should be any better off if he himself had seen Walker's types and described them?

II.—Concerning Riley's theory.

I may truly say that I was an entomologist before Mr. Lyman was born, and it seems to me "only the other day" that Prof. Riley propounded his theory that "many names," of which he instanced four, viz., *cunea*, Drury; *textor*, Harris; *punctata*, Fitch, and *punctatissima*, S. & A., were merely synonyms—the first of the four having the priority. Up to that time no one had thought of calling the moth from our Northern Fall Web-worm anything but *textor*. Walsh and Riley so designated it in Vols. I. and II. of the "*American Entomologist*"; so did Packard in his "Guide" my copy is one of the 7th edition, published in 1883; and Saunders, in his "Insects Injurious to Fruits," published in the same year.

Riley had done good work as an entomologist, and men were disposed to accept his teaching without question. Dr. Smith adopted it, and "Smith's List" has been the guide of our younger entomologists. Hence the use of *cunea* to designate the moths from Fall Web-worms.

But I maintain that when I spoke of *Bombyx cunea*, Drury, no one had a right to assume that I meant something else—that I meant (to adopt Dr. Dyar's formula) *cunea*, Riley (nec Drury).

If no one till now has questioned the identy of *cunea*, Drury, and *punctatissima*, S. & A., it has been because no one has had the reason for questioning it that now exists, viz., the discovery of an insect that more closely answers to Drury's figure *and description* than punctatissima does.

Whether *Hyphantria punctatissima*, S. & A., and *H. textor*, Harris, are identical or not can be easily proved by our Southern entomologists. They have only to breed carefully from eggs of each sort to determine the matter. It will be "too ridiculous" if it should prove that in this respect also we have been misled by Riley that after all there is but one brood of *textor* in the season, and but one brood of *punctatissima*, and

that these insects are specifically distinct one from the other. In the meantime it *is* surprising that Mr. Lyman, above everybody else, should countenance a question whether these insects are so distinct, for such a question implies a suspicion that *that eminent entomologist, Dr. Riley, confused two or more species of moths.*

It requires considerable courage and self-confidence for a man to assume the rôle of general critic and censor, and a critic should be careful not to misrepresent those whom he attacks. Where is the relevancy, or the correctness, of Mr. Lyman's statement that I overlooked the fact of the priority of the name *punctatissima* over that of *textor*, seeing that, on page 360 in the December number of the CANADIAN ENTOMOLOGIST, I arranged the Hyphantrians thus :

HYPHANTRIA, Harris.
Punctatissima, S. & A.
textor, Harris ?

Again, on page 128 he says, speaking of myself, "He is wrong in implying that Dr. Ottolengui doubted the identity of *cunea*, Drury, and *punctatissima*, A. & S." I implied nothing of the sort.

He continues, "What Dr. Ottolengui expressed a doubt about was whether *textor*, Harris, and *punctatissima*, A. & S., were the same." Is not that what I said? My words were, "By these forms I understand him to mean punctatissima and textor." Mr. Lyman failed to perceive that I was showing the weakness of Riley's theory in *two* particulars, testing the chain at two points.

It is usually understood that Riley was his own artist (and a very good artist too!). Whether he drew the figures 86 and 87, of which so much has been said, does not appear; but in the figures there are no lines of dimensions, in the letterpress there is no word as to enlargement or inaccuracy. We must therefore conclude that the figures are what Riley intended them to be. Yet Mr. Lyman speaks of the dimensions of Fig. 86 as "absurd," and alludes to inaccuracies in the wing-series. *In fact, I have to thank him for fully sustaining my second contention*, for if, as he says, Riley's series of wing-figures were merely intended to show the *range* of variations of a variable species, how can they be regarded as "a proof amounting to a demonstration" that *cunea*, Drury; *congrua*, Walker; *textor*, Harris; *punctatissima*, S. & A., etc., etc., are one and the same species?

No one supposed, and it was absurd to suppose, that anyone was in danger of supposing that Riley figured only moths coming from a black ground-feeding larva.

III.—Concerning Drury's *cunea* and the Quebec Spilosoma.

The discussion of the Cunea question was not uncalled for, and has not been unprofitable. It is well that so much information on the subject has been brought together. In this respect Mr. Lyman has done good service. We can now see clearly the slight basis on which the theory of the identity of *cunea* and *punctatissima* has been built, viz., two uncertain references, made long ago, by two old-world entomologists, and the fact that punctatissima is a variable species. The references are: "Whether this be the cunea of Mr. Drury or not" (Sir James Smith), and "There seems little reason for doubting that this is identical with the Phalæna punctatissima of Abbott and Smith" (Westwood). We have no reason to think that either of the writers had seen Drury's types. Upon so trivial a foundation the theory has been built!

Mr. Lyman thinks Smith and Abbot's figure of punctatissima admirable, and that it shows perfect bilateral symmetry. Let us see! In the left secondary of the figure there is a black spot near the tip, and behind it, running towards the body, are two others; on the right secondary the three spots run in a line along the outer margin; and this is what Mr. Lyman calls "perfect bilateral symmetry"! He objects to my expression "fancy sketch." Is it then a *reality* that, in the favoured South, imagoes and larvæ of punctatissima may be seen on mulberry bushes at one time?

I *had* overlooked Drury's description of cunea. I am glad to read it—it strengthens my case. Mr. Lyman gives it in full on page 122. I will quote the English of the description to save the reader the trouble of reference, and that there may be no mistake as to terms. I give the Old Country meanings of ash-coloured and tip:

"Ash-colored, a., between brown and gray, like the bark of ash"..... *Reid's Dictionary*.

"Tip, the part where the costa meets the hind margin"..... *Stainton's Manual*, Vol I., x.

The description is as follows:

"*Upper side.*—Antennæ pectinated and black. There is no appearance of any tongue. Head white. Back and abdomen ash colour.

Anterior wings white, with a great number of spots, differently shaped, of a sooty black colour. On the external margin are five spots, those nearest the tips being shaped like triangles. Posterior wings white, with a sooty spot on each near the external edge, and a very faint small mark near the exterior angle. *Under side.*—Legs black. Breast and abdomen ash colour. The wings marked as on the upper side."

We may well ask, Would anyone identify *H. punctatissima* by this description? Riley (as Mr. Lyman has said) has given us the "range" of variation of this variable species. He has given us ten representations (there *are* ten—Mr. Lyman did not count correctly). Possibly a hundred more might have been introduced, but Riley gives the *range. The extremes are there.* Take *i* and *j* at one extreme of the series, those that have the triangles upon which so much stress has been laid. Do they answer to the description? No; *the triangles are at the wrong end!*

Reference has been made to the name cunea. The name *cunea* carries its own meaning. Cunea cuneia (Gr.), of, or pertaining to, a dog, and this, with the generic term *Spilosoma* (spotted body), makes up a very fitting appellation for the species.

How *cunea* can *properly* be derived from *cuneus* (L.), a wedge, has not been shown us. As Mr. Lyman says, I have *chosen* to call the *Bombyx cunea* of Drury a *Spilosoma*. I have done so because Westwood and Walker *chose* to call it so; and because we have not the slightest particle of evidence that the insect was an Hyphantrian.

In the January number of the CANADIAN ENTOMOLOGIST for this year, page 16, appear these words from Dr. Dyar: "There can be no manner of doubt of Drury's figure. It represents the spotted form of Hyphantria. The description of the abdomen at the last resort is conclusive." I passed this enigmatical statement by as "one of those things that no fellah can understand." But Mr. Lyman has acted as interpreter. He says: "In the January number of the present year Dr. Dyar very briefly points out Dr. Fyles's error, calling attention to the fact that of cunea the abdomen is described as 'concolori nigro-maculato,' the English description saying back and abdomen ash-colour."

Let us see how things stand:

1. a. Walker's cunea had the abdomen yellowish, white on the hind borders of the segments and towards the tip.....(B. M. Cat. III., p. 669, n. 7).

b. Walker's cunea "was doubtless punctatissima".....(Lyman, p. 121, May number).

2. a. Drury's cunea has the back and abdomen ash-colour.....(Drury's description).

b. "There is no doubt of the identity of cunea and punctatissima".....(Riley and Smith).

3. a. Drury's figure shows a white abdomen.(Lyman, p. 128, May number).

b. "There can be no manner of doubt of Drury's figure. It represents the spotted form of Hyphantria".(Dyar, p. 16, January number)

No difficulty whatever is made of the logical conclusions that the abdomen of *punctatissima* is *yellowish, white at the edges and towards the tip*; that it is *ash-colour*; and furthermore, that it is *white*. But when I described the Quebec insect as having an abdomen *yellow ("yellowish"), white at the edges and towards the tip*, why then "the description of the abdomen at the last resort was conclusive" (Dyar). Conclusive of what? That Dr. Fyles was in "error" (Lyman). The description should be back and abdomen ash-colour.

However, the difficulty as to the abdomen in the case of cunea can be easily cleared up by a comparison with congrua.

Last year I sent a specimen of congrua to Washington. When it left me the insect had an abdomen pure white. When it came back to me, the abdomen was ash-coloured. The long fluffy feathers had been shaken off, and only a slight down remained. Other moths of the batch to which this belonged are losing their white clothing. One has the white in patches only, both on the back and the abdomen.

So also as regards my specimens of *S. cunea*, Drury. The male has been to London, Ont., and back (1,200 miles), and has now an ash-coloured abdomen. The female that I mentioned in my first paper still answers to Walker's description. A second female taken by Edgar Walters at Bourg Louis has been less disturbed, and has more white and less yellow on the abdomen. All these specimens were somewhat worn when they were taken, and I think it very probable that originally they had white abdomens, as the specimens of congrua had. The abdominal scales and feathers are alike in both insects.

Lest the readers of the CANADIAN ENTOMOLOGIST should be misled by Mr. Lyman's words, "I can see no resemblance beyond the most superficial between his specimen and Drury's figure," I beg to state that Mr. Lyman has never had my specimen in his possession.

The resemblance of the Quebec Spilosoma to Drury's *is* superficial "most superficial."

The size is the same.

The contour is the same.

The coloration is the same.

The arrangement of the spots is the same.

The triangle is in the right place.

The variation in the abdomen is accounted for, and there is no straining to fit an extreme variety, or a spotless female, into the case.

What the resemblance *internally* may be, I cannot say. I must leave Mr. Lyman to find out. And with this parting shot, I retire from the field—*my guns uncaptured*; my forces unbroken.

DESCRIPTION OF PLATE 4.

The plate is made from an admirable photograph taken by Prof. H. Walters, M. A., Morrin College. The figures of the moths are of the natural size.

Figs. 1 and 2 represent *Hyphantria textor*, Harris. The insects were raised at Levis by myself.

Figs. 3, 4, 5 and 6 show specimens of *Spilosoma congrua*, Walker. One male is all but immaculate—it has a tiny dot at the angle of the second fork of the median nerve. The abdomen of the insect represented was originally pure white; it is now yellow, white at the edges of the segments and towards the tip. The other male represented is more spotted, and has now an ash-coloured abdomen with longitudinal rows of spots. One female answers to Grote and Robinson's description. The other is more spotted.

Figs. 7 and 8 represent a pair of *Hyphantria punctatissima*, S. and A. The moths were sent to me by Mr. H. H. Newcomb, of Boston, and were raised by Miss Emily L. Morton, of New Windsor, N. Y. Miss Morton says of these insects: "I have raised a great many of them, and there is very little variation; the female is invariably immaculate."

In Figs. 9 and 10 a pair of the Spilosomas we have had under consideration are seen. The male was taken at Bergerville, Quebec, by Miss Bickell; the female was taken at Bourg Louis, Quebec, by Edgar Walters. In the Plate the black pectinations of the antennæ of the male do not show against the dark background. T. W. F.

[This controversy is now closed, so far as the pages of this magazine are concerned.—Ed. C. E.]

SOME NEW JASSIDÆ FROM THE SOUTHWEST.

BY E. D. BALL, FORT COLLINS, COLO.

Phlepsius lascivius, n. sp.—Resembling *altus*, slightly larger and lighter coloured; margin of the vertex black either side of a light tip. Length 6 mm.; width 2 mm.

Head as wide as the pronotum, vertex depressed at the base, anteriorly convex and rounding to the front, the apex slightly angled, hardly half longer than at eye, two and one-half times wider than long, more than half as long as the pronotum, front broad, convex in both diameters, roundingly narrowing below; clypeus with the margins straight; elytra rather stout and straight, flaring behind, the claval nervures parallel, not united.

Colour: soiled yellowish white closely inscribed with brownish fuscous. Vertex with an irregular black cloud either side of the white apex, back of this a white crescent, behind which the surface is irrorate with pale fulvous brown, a semi-pupillate spot either side at the base; face heavily irrorate with fuscous, the black clouds of the vertex uniting below the apex, a few light arcs on the front and a light band across the clypeus and loræ; pronotum closely irrorate with fuscous; scutellum washed with dirty fulvous, a pair of black points on the margin on either side; elytra milk white, finely inscribed with fuscous, which is not in irregular lines except on costal and apical margins.

Genitalia: ultimate ventral segment of the female very long, the posterior margin truncate, the median third with a pair of very slight, evenly-rounded lobes, between which there is a distinct notch; male valve very broad, obtusely triangular, plates three times the length of the valve, broad at base, roundingly narrowing half their length, then produced as bluntly pointed divergent lobes.

Described from eight females and four males taken at Holly, Pueblo, and Fort Collins, Colo., and Kimball, Neb. Part of the Fort Collins specimens came from back in the mountain gulches.

Phlepsius turpiculus, n. sp.—Resembling *cinereus*, but more heavily irrorate. Pale straw yellow, irrorate with fulvous brown. Length, ♂ 7 mm., ♀ 6 mm.; width, ♀ 2 mm., ♂ 1.5 mm.

Head as wide as the pronotum, vertex but little longer on middle than against eye, half as long as the pronotum, surface convex, passage to the front roundingly angulate; front broad above, feebly convex, almost angled at the antennæ; clypeus narrow just before the base; elytra long,

narrowing apically : veins on clavus sometimes tied before the middle, but not converging.

Colour : a dirty creamy yellow, washed and irrorate with brownish fulvous, vertex and face washed and very finely irrorate with dirty fulvous, omitting a light line marking the boundary between them, and a crescent behind the apex of the vertex ; elytra rather coarsely and uniformly irrorate, lower side and legs washed with fulvous, scarcely marked.

Genitalia : ultimate ventral segment of the female twice the length of the penultimate, slightly notched in the middle of the posterior margin, either side of which it is slightly sinuated to the rectangular lateral angles; male valve triangular, the margins indented midway to the apex, plates gradually narrowing to half their basal width, then extending as acutely tipped, attingent, finger-like processes four times the length of the valve.

Described from numerous specimens collected at Holly and Fort Collins, Colo., and at Stratton, Neb. This species and *lascivius* have female genitalia much alike in pattern, while the male plates are quite different ; those of *turpiculus* resembling *irroratus*, while *lascivius* resembles *nebulosus*.

Phlepsius graphicus, n. sp.—Resembling *superbus*, slightly longer and heavier built, the lobate commissural line distinct. Length 7 mm.; width 3 mm.

Head narrower than the pronotum, vertex sloping, the margin distinct but not compressed ; width at base twice the middle length, very slightly longer on middle than at eye, more than half the length of the pronotum ; front broad above, rounding to the spatulate clypeus below ; elytra long, flaring apically, the claval nervures tied by a cross nervure before the middle.

Colour : ground colour soiled straw yellow, vertex and pronotum irrorate with testaceous, a round spot on either side the vetex at the base, and pupillate spots on the pronotum behind these, a pair of round spots on the scutellum, the apical part light ; elytra pale, the nervures and irrorations brownish fuscous, the scutellar margin and a lobate commissural line light, irrorations gathered into fuscous spots along the costa ; face heavily irrorate with brownish fuscous ; legs light, marked and lined with fuscous.

Genitalia : ultimate ventral segment of the female three times as long

as the penultimate, lateral margins sloping, lateral angles slightly produced and rounding, posterior margin with two rounding teeth on each side of the deep median incision, the outer pair extending obliquely inwards, twice as long as the inner pair; male valve less than half as long as the ultimate segment, semicircular, plates twice the width of the valve, almost semicircular, slightly elongate, the margin fringed with fine white hairs, four strong spines inside the margin on either side.

Described from fourteen specimens from Wray and Fort Collins, Colo., and Kimball, Neb.

Phlepsius cumulatus, n. sp.—Intermediate in size and colour between *graphicus* and *superbus*, lobate commissural line faint. Length 6.5 mm.; width nearly 3 mm.

Head narrower than the pronotum, vertex nearly parallel margined, slightly sloping, passage to the front distinct but not angled, front broader than in *superbus* and not as convex; elytra broad and slightly compressed behind, the irrorations finer and weaker than in *graphicus*.

Colour: yellowish fulvous irrorate with a rich testaceous brown shading to fuscous where the irrorations are thickened up; the anterior margin of vertex with a light line interrupted in the middle by a red point, two fuscous points on the disc of the scutellum, the commissural line faintly lobate; below tawny yellow, the front heavily marked with brownish fuscous, the rest of face and legs maculate.

Genitalia: the ultimate ventral segment of the female two and one-half times longer than the penultimate, cleft in the middle nearly to the base by a triangular notch, either side of which there is another slight notch; from the outer lobe thus formed it rounds off to the base without lateral angles; male valve triangular, plates twice the length of the valve, the sides roundingly angulate, the tips slightly angularly divergent, a dark spot at the inner angle at the base, the margin fringed with fine hairs, the submargin with a few white spines.

Described from numerous specimens taken at Fort Collins, Virginia Dale, Pinewood, and Livermore, Colo., all within the mountains, from the first foothills up to 7,000 feet.

Variety *arctostaphylæ*, n. var.—The preceding species was swept as larvæ and adults from Snowberry (*Symphoricarpos* sp.), where it was found in abundance: a little higher up on the mountains a few specimens, along with their larvæ, of a smaller and darker species were taken from

Bearberry (*Arctostaphylos uva-ursi*); superficially they resemble dark specimens of *altus*, but structurally they could not be separated from *cumulatus* with the material in hand.

They are shorter and heavier than *cumulatus*, with short broad elytra which just cover the abdomen. In colour they are a much darker testaceous, shading to fuscous.

Phlepsius albidus, n. sp.—Small, pale greenish white, resembling *Eutettix insana* until closely examined, slightly more robust. Length 4.5 mm.; width 1.25 mm.

Head as wide as the pronotum, vertex flat, slightly sloping, slightly but distinctly angled before, a little over half as long as its basal width, two-thirds the length of the pronotum; front convex in both diameters, scarcely narrowing until just before the apex; elytra moderately long, compressed behind, the claval nervures straight.

Colour: vertex face and scutellum pale, creamy yellow; pronotum with a greenish cast; elytra white, with fine, almost microscopic, greenish fuscous irrorations, a dark point at apex of clavus and a pair at the outer angles of the loræ; beneath greenish white.

Genitalia: ultimate ventral segment of the female about twice longer than the penultimate, posterior margin slightly rounding, two small rounding lobes faintly outlined at the centre.

Described from four females taken at Pueblo, Colo. In the white colour and the greenish character of the irrorations this species is very distinct from any before described.

Eutettix insana, n. sp.—Form of *modesta* nearly, but smaller, pale, slightly greenish, white, peppered all over, thickest on the elytra, with small round black specks. Length, ♀ 4 mm., ♂ 3.25 mm.; width 1 mm.

Vertex nearly flat, a third longer in the middle than at the eye; three-fourths as long as the pronotum, two-thirds as long as its basal width, rounding to the convex front, which is slightly expanded below the antennal pits, clypeus convex-margined above; elytra moderately long, flaring as in *modesta*, venation rather weak, the claval nervures either coalescing or tied across in the middle.

Colour: vertex and face pale greenish orange, vertex with a few small spots; pronotum olive with scattered dark dots; elytra white, sprinkled all over with small round dots which appear to be on the surface, all below white, somewhat dotted on legs, connexivum and pygofers.

Genitalia: ultimate ventral segment of the female three times the length of the penultimate, angularly excavated from the acute lateral angles half way to the base in the middle, from which arises a strap-like tooth, nearly equalling the lateral angles, its apex rounded; male valve not as long as the ultimate segment, very obtusely triangular, plates broad at base, triangularly narrowing to one-third their original width, then extending as acutely tapering up-turned points.

Described from numerous specimens taken at Pueblo, Colo.

Eutettix stricta, n. sp.—Form of *insana*, but narrower, pale yellow, with a golden reflection, especially in the males. Length, ♀ 4 mm., ♂ 3.5 mm.

Vertex nearly parallel margined, almost twice wider than long, as wide as the pronotum is long, the surface slightly depressed, bluntly rounding to the front, face as in *insana*; elytra rather long, narrowing behind, veins on clavus not united.

Colour: vertex orange or greenish yellow, sometimes a pair of spots behind the apex, face lemon yellow, front with about seven short brown arcs, the upper pair very oblique; pronotum olive or yellowish; scutellum orange, a pair of brown spots on the disc; elytra greenish or golden subhyaline; below lemon yellow, rostrum orange.

Genitalia: ultimate ventral segment of the female two and one-half times the length of the penultimate, the lateral margins narrowing posteriorly, posterior margin truncate, with a broad just noticeable median projection; ovipositor rather long, orange; pygofers narrow, greenish; male valve very short and broad, about half the length of the ultimate segment, plates very broad at base, long triangular, with the acute apices produced and coloured bright orange.

Described from numerous examples collected in Ariz. by Dr. Kunze.

Deltocephalus grammicus, n. sp.—Form of *albidus* nearly, but longer and narrower. Lemon yellow, with six brown stripes on pronotum and elytra. Length 5.25 mm.; width 1.25 mm.

Vertex flat, roundingly right angled, a fifth longer than its basal width, over half longer on its middle than against the eye, a fifth longer than the pronotum; face making an acute angle with the vertex, front very narrow, resembling a *Platymetopius*; elytra long, flaring, venation similar to that of *imputans*, obscured by the colour lines, veins on clavus coalescing for one-third their length.

Colour: vertex white, washed with yellow, a crescent either side the point, a dash on the lateral margin and interrupted before the middle, brownish fuscous; face pale yellow, a narrow black line just under the margin of the vertex; pronotum yellow, with six dark brown stripes, the inner and broader pair arising behind the middle of the vertex, continuing across the scutellum; elytra yellow, with five light brown stripes on each side, interrupted by the light nervures, the reflexed vemlets broadly white, lined anteriorly with fuscous; below pale yellow.

Genitalia: ultimate ventral segment of the female half longer than the penultimate, the posterior margin angularly excavated one-third its depth, margins of the excavation near the centre slightly toothed and marked with black.

Described from three females; two taken from the Platte valley at Sneyder and Julesburg, Colo., and one from Kimball, Neb. This is a very distinct species, and though unquestionably a member of the reflex-veined Deltocephalids, still in face characters it recalls a *Platymetopius*, and in colour and ornamentation it might easily be confused with *Athysanus colon* or *texanus*.

A NEW SPECIES OF KERMES.

BY E. E. BOGUE, M. S., STILLWATER, OKLAHOMA.

Kermes trinotatus, n. sp.—Female scale variable in size, averaging about 5½ mm. long, 6 mm. wide, and 4½ mm. high; rounded above, somewhat flattened behind, convex beneath, front turned down into a more or less beak-like prominence; median groove obscure or broad and shallow; colour varies from bright argillaceous to dull gray; surface uniform, more or less conspicuously speckled with black; segmentation obscurely or plainly marked with dark spots. When the median groove is present it is crossed with more or less dark lines showing segmentation. There is a rounded dark spot on each side of the front, and an elongated dark blotch extending for a short distance above and below the anal opening: hence the specific appellation.

Larvæ 416 μ long by half as broad; caudal setæ 160 μ long; antennæ 100 μ long, 6 jointed, formula (1, 2) (3, 4) (5) (6), 6 longest, 3 and 4 shortest, a few hairs towards tip; marginal spines conspicuous around the head, a prominent one each side of each caudal seta; claws of feet simple, slightly curved inward, accompanied by a few hairs. Abundant

in certain localities near Stillwater, Oklahoma, on Quercus nigra, and occurs in other regions on various species of Quercus. The species is very variable in colour, size and markings, and it is possible that more than one species is included in the description. Further study of larval characters would be necessary to separate them. It seems to be frequent across the continent. I have it from Dr. J. A. Lintner, Albany, N. Y.; Dr. John B. Smith, New Brunswick, N. J.; Mr. W. M. Scott, Atlanta, Ga., and a large number of specimens from Stillwater, Okla. Dr. L. O. Howard wrote me from Washington, D. C., under date of Jan. 5, 1899, that the same species bears their (U. S. Nat. Mus.) numbers 722, 2404, 3706 and 7387, and bears a manuscript name. No. 1097 in collection Okla. Expt. Sta.

The species is one or more of the forms that have passed under the name of Kermes galliformis, Riley. Mr. Theo. Pergande kindly compared specimens with type specimens of Kermes galliformis, Riley, and has decided them to be very distinct. Dr. Riley's description is not available to most entomologists of to-day, so I should like to record here what he says of it: "Kermes, galliformis, n. sp. A new species of oak coccid mistaken for a gall. An esteemed correspondent from Ohio (Dr. John Waider) sends us what he supposed to be some kind of a gall which he found at Iron Mountain, Mo., on twigs of Quercus palustris. They are pretty, large, globular, or almost globular, objects fastened to the twigs either singly or in clusters as we are accustomed to see certain Cynipid galls. Their shining yellow surface is handsomely variegated with light brown patches. The particular species sent by our correspondent is undescribed, and may be characterized as follows: Mature female scale, average length 5 mm. Subspherical, usually somewhat broader than long, and often with a broad shallow constriction medio-dorsally. Attached by a broad, dark brown cut or excavation which is covered by a beak anteriorly and notched anally, the brown colour extending to a point above the notch. Polished and smooth. Ground colour pale yellowish, appearing under lens minutely and evenly specked with brown, more or less suffused or mottled with gray or brown, the constriction when present generally dark. A series of about seven irregular rows of black punctations running across the scale, often connected by an irregular black line, and this again relieved by white or pale yellow. The uppermost row distinct and constant."

The form found at Stillwater, O. T., is considered typical of K. trinotatus.

NOTES ON IDIOCERUS (JASSIDÆ).

BY C. F. BAKER, ST. LOUIS, MO.

There has just come into my hands (April, 1900) the paper on this genus by Osborn and Bail in the Proc. Davenport Acad. Sci., Dec., 1898. As some of my conclusions regarding the species of this genus do not coincide with those of the above authors, it may be of interest to present another view.

Verticis, *ramentosus* and *striola* are in the same condition *Deltocephalus Melsheimeri* used to be in: different authors might readily find many different forms that possibly fit the descriptions. Perhaps the types *ramentosus* and *striola* are in existence. I think more harm than good will come of attempts to identify these three forms without further data than the mere descriptions.

Prof. Osborn does not say that he has ever examined the type of *Duzei*. From his description it is apparent that he has not. VanDuzee described the species in MS., and returned the specimen to Provancher, telling him it was new. Provancher promptly published it. This description by VanDuzee has been in my hands for some time. He should have published it. I quote it herewith: "Form and size of *lachrymalis* nearly, the elytra shorter and the sides of the pronotum more rounded off than in that species. Colour brownish fulvous above, pale and more yellowish beneath. Tergum, the narrow edge and hind margin excepted, black; tibiæ and tarsi tinged with fulvous. Elytra hyaline, faintly tinged with smoky; nervures concolorous, obscure, the costal yellowish. Wings faintly smoky-hyaline, iridescent, nervures brown. Transverse impressed line of the scutellum black, angled. Form of the facial pieces very similar to those of *lachrymalis*. Last ventral segment of female feebly trilobate, the median lobe the largest, lateral angles retreating. Pygofers large and stout, much exceeded by the brownish oviduct. Eyes black. Length 6.5 mm." To this description Mr. VanDuzee appended the following note: "The above description was taken from the very example M. Provancher founded his species on. I returned the specimen to him, marked n. sp., and he described it."

To be more exact concerning the oviduct, it is exserted about a third the length of the pygofers. If a careful comparison of this description with the description and figures of *perplexus* be made, it will be seen at once that they cannot possibly refer to the same insect. Prof.

Osborn had not seen the type of *Duzei* nor that of *perplexus*. He knew I had the type of *perplexus*, and I have offered to loan him anything I had. I have specimens of *Duzei* from Colo., however, that are quite typical as to length of oviduct, brown veins in wings and coloration. I did not refer *perplexus* to a varietal form of *pallidus* without carefully sifting all the evidence, but that it should be *Duzei* is an impossibility. The *Duzei* of Osborn becomes a synonym of *perplexus*, probably.

The types of *distinctus* and *mimicus* are in my collection, where they have been since the day names were put on them. So Prof. Osborn's remarks on this point are not exact. My collection is now in the National Museum, where anyone may study these types at their leisure.

Since *productus* was described, I have collected many perfectly-formed, healthy specimens of it, both male and female, and I can only say that they are absolutely uniform in the "remarkable characters" indicated in the original description, and that these characters are most positively *not* "due to the vertex having been pushed forward and crushed along a middle line. If I remember correctly, the type is not a "crushed specimen." Prof. Osborn has not seen the type, though he could easily have done so. I fail to see how crushing could produce the peculiar inflation found in the head of this species.

A NEW SESIA FROM ALASKA.

BY WILLIAM BEUTENMULLER, NEW YORK.

Male.—Head, palpi and thorax entirely black. Abdomen black with a very narrow white ring at the posterior edge of the second and fourth segments. Anal tuft black. Legs black, with the hind tarsi dirty white. Fore wings transparent, with black borders and a broad black transverse mark. Hind wings transparent, with a narrow black margin. Under side of fore wings washed with golden yellow, basally. Hind wings same as above. Expanse, 20 mm.

Habitat.—Kodiak, Alaska, July 20th, 1899.

Type.—One male, No. 5175, Coll. U. S. Nat. Mus; collected by Mr. Trevor Kincaid; somewhat allied to *Sesia rutilans*, but has white bands on the abdomen instead of yellow ones as in that species. The palpi are wholly black, while in *rutilans* they are golden yellow and black. The female is not known.

TYPES OF NOCTUID GENERA.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

I refer the student to papers of mine on this subject in *The Entomologist's Record*, Vol. VI., pp. 27 and 77. The principal types given by me for genera found in North America are as follows:

Agrotis, Hübn., 1806, type: A. segetum.
Graphiphora, Hübn., 1806, type: G. gothica.
Gortyna, Ochs., 1816, type: G. micacea.
Ochria, Hübn., 1816, type: O. flavago (ochracea).
Hylena, Hübn., 1806, type: X. lithoxylea.
Lithophane, Hübn., 1816, type: L. socia (petrificata).
Hadena, Schrank, 1802, type: H. cucubali.
Helioscota, Grote, 1895, type: H. miselioides.
Acontia, Ochs., 1816, type: A. malvæ.
Eustrotia, Hübn., 1816, type: E. unca.
Copimamestra, Grote, 1883, type: C. brassicæ.
Oligia, Hübn., 1816, type: O. strigilis.

I now give the literary evidence for the types of:

Luperina, Boisd., 1829, type: L. testacea.
Ledereria, Grote, 1874, type: L. virens.
Apamea, Ochs., 1816, type: A. didyma.
Hydræcia, Guen., 1841, type: H. nictitans, Linn., sp.

Ledereria.

1874. Grote, Bull. Buff. Soc. Nat. Sci., 54. The name is proposed generally for *Luperina*, Led., nec Boisd. The type *virens* is afterwards given in *Entomologist's Record*, VIII., 183 (1896).

Hydræcia.

1841. Guenée, Noct. Eur. Index Meth., Ann. Soc. Ent., Fr., Tom. X, 237: cuprœa, leucostigma, micacea, *nictitans*. No description; no type given.

These are the original species of *Hydræcia; cuprœa (cuprea)* is an *Agrotis; leucostigma* was taken afterwards in 1857 by Lederer as type of *Helotropha; micacea* became in 1816 type of *Gortyna*, Ochs.; *nictitans* appears to be hardly generically separable from *micacea*. *Leucostigma* would be therefore type of *Hydræcia*, and *Helotropha* falls; the only alternative is to make *nictitans* type, and elevate this into a genus, which course I adopted in 1874.

1852. Guenée, Species Général, V., 125 : nictitans, luceus, lorea, cuprea, vindelicia, micacea, immanis, stramentosa.

Guenée here adds American species, of which one has hairy eyes *(lorea)*; so, following H.-S., I referred it in 1874 to *Mamestra*. *Leucostigma* is placed back in *Apamea* (l. c. 210); the mixture which is *Hydroecia* has lost a *Heliotropha* and gained a *Mamestra*, and the scientific value of the term, which was originally = O, is unchanged. *Micacea* is made type, but this species is preoccupied, through Hübner in the Verzeichniss, for *Gortyna*.

1874. Grote, List of the Noctuidæ of North America, Bull. Buf. Soc. Nat. Sci., April, 1874, 18 : nictitans (Linn.), sera, inquæsita, †salicarum (then unknown to me). Type indicated as *nictitans*, and genus correctly dated 1841. The question of whether this genus is valid must depend upon the classificator. It stands or falls with its type. As designated by Guenée in 1852, it would have the same type with *Gortyna*, and, of course, it would fall. To save it by the sacrifice of *Heliotropha*, Led., does not seem to me advisable, and, after my action in 1874, perhaps inadmissible.

Apamea.

1816. Ochs., Schm. Eur., IV., 75 : nictitans (oculea), fibrosa (lecostigma), argillacea, unanimis. *didyma*. ophiogramma, bicoloraria, captiuncula, suffruncula, latruncula, strigilis, connexa, testacea, basilinea, infesta, cespitis, graminis, leucographa, bella, umbrosa, cuprea. This mixture, for which no description or type is given, belongs to six or seven Ledererian genera.

1829. Boisd., Eur. Lep. Index Method., 76 : nictitans (Linn.), occlusa, leucostigma (fibrosa), didyma (v. nictitans, Esp.), v. ophiogramma, furuncula, captiuncula, suffruncula, latruncula, strigilis, connexa, ? leucographa.

1840. Boisd., Gen. et Index Meth., 116 : strigilis, v. suffruncula, furuncula, captiuncula, Duponchelii, v. microglossa, erratricula, signalis.

This further restriction would make the genus = *Oligia*, Hübn., type *strigilis*, but this interferes.

1837. Guen., Ann. Soc. Ent., Fr., I. Ser., Tom. 6, 333 : nictitans (Linn.), latruncula, captiuncula, furuncula, suffruncula, ophiogramma, didyma, unanimis, gemina, infesta, testacea, Dumerilii.

1841. Guen., Noct. Eur. Index Meth. Ann. Soc. Ent., Fr., I. Ser., Tom. 10: ophiogramma, didyma, unanimis, gemina. Except the first, which goes to *Oligia*, Lederer's section C, this restriction gives us species belonging to Lederer's section B of *Hadena*, Led., nec Schrank. Hübn. does not use *Apamea*. Further citations have no bearing on the subject of the type, which may be accordingly taken as *didyma*.

The species heretofore classed under *Hadena*, Led., fall to *Xylena* (=Xylophasia), *Helioscota*, *Apamea* and *Oligia*. The European type *Harus ochroleuca* is not recognized as American.

Luperina.

1829. Boisd., Europ. Lep. Index Meth., 77: Dumerilii, argillacea, *testacea*, contribulis, cespitis. One of the above must be type. The use of this term for *virens*, etc., by Lederer is therefore erroneous. For *Luperina*, Led., nec Boisd., type *virens*, the term *Ledereria*, Grote, 1874, should be used. *Testacea* may be taken as type, taking with it *Dumerilii*. *Argillacea* is a var. of *Hadena (Dianthœcia) luteago*. *Cespitis* is apparently type of *Tholera; contribulis* is apocryphal. This generic term, as previously suspected by me, must be used instead of *Apamea*, Led., nec Ochs. The subsequent enlargements of *Luperina* by Boisduval (1840) and Guenée (1841) have no bearing on the question of type. In literature of the North American Noctuid Fauna this name has been seemingly wrongly applied. The existence in our North American fauna of species congeneric with *Luperina testacea* or *Ledereria virens* has not been made out as yet satisfactorily. In all cases, to insure the "scientific" application of the generic name, the type species as here given must be studied and compared with American material. It is very necessary at the moment that this should be done before the issue of a new Catalogue. For this reason I publish the literary evidence so that it may be looked into and, if possible, contradicted or corrected. I had brought the classification of the North American Noctuids into general harmony with Lederer's, so far as structure was concerned. I could not always adopt his generic names, because he had made no literary study of the subject, had taken at times the first name which came to hand in fact, and had repudiated the authority of the Verzeichniss, now acknowledged by almost all writers in England

and America. I believe, with this paper, to have discussed the principal points where Lederer cannot be followed. I may say, in conclusion, that my former use of *Parastichtis*, Hübn., Verz., type *suspecta*, is warranted, since the other species follow *didyma* to *Apamea*, Ochs., 1816, nec Lederer.

SOME SPECIES OF DIPTERA INHABITING OR FREQUENTING THE WHEAT FIELDS OF THE MIDDLE WEST.

BY F. M. WEBSTER, WOOSTER, OHIO.

The swarms of small Diptera that are to be found in the fields of fall wheat in Ohio, Indiana and Illinois, during late autumn and in early spring, seldom fail to attract the attention of the entomologist who has occasion to visit these fields at the above mentioned seasons. That some species are attracted to these fields as mere visitants is indicated by the accompanying list, but that many others breed there, either upon the living or the dead portions of the wheat plants, is as clearly apparent.

It has been my custom each year fo sow a small patch of wheat as early as possible, in order to attract the various inhabitants among insects, in order to study them. In August, 1897, a small plat of wheat was sown at the Experiment Station at Wooster, Ohio, and late in the fall, under my direction, a large number of these plants were transferred to a breeding cage in the insectary, and the results of this breeding were carefully watched by my former assistant, Mr. C. W. Mally. During the following April the various experiment plats of wheat were swept with an insect net and the results properly preserved.

From the wheat plants enclosed in a breeding cage, in the insectary, there emerged, during December, the following species of flies:

Cecidomyia destructor, Say.
Cecidomyia, sp.?
Diplosis, sp.?
Sciaria, sps.? (2)
Phorbia ruficeps, Zett.
Phorbia cinerella, Fallen.
Meromyza Americana, Fitch.
Oscinis dorsata, Loew.
Oscinis coxendix, Fitch.
Oscinis umbrosa, Loew.
Oscinis carbonaria, Loew.
Oscinis trigramma, Loew.
Ceratomyza dorsalis, Loew.

From the same lot of wheat plants there appeared during the following April:

Diplosis, sp.?
Chironomus, sp.?
Oscinis carbonaria, Loew.
Bibio pallipes, Say.

Sweeping the wheat plats during April gave us the following species, some of them being, clearly, mere visitants :

Sciara, sps.? (2)
Rhamphomyia, sp.?
Bibio albipennis, Say.
Chironomus, sp ?
Phora pachyneuron, Loew.
Phora spinipes, Coq.
Phora, sp.?
Phorbia ruficeps, Zett.
Phorbia cinerella, Fallen.
Phorbia, sps.? (3)
Borborus equinus, Fallen.
Limosina crassimana, Haliday.
Diastata nebulosa, Fallen.
Elachiptera longula, Loew.
Oscinis coxendix, Fitch.
Drosophila funebris, Fabr.
Tetanocera pictipes, Loew.
Sepedon armipes, Loew.
Scatophaga furcata, Say.
Scatophaga stercoraria, Linn.
Hyelomyia, sps.? (3)
Anthomyia, sp.?
Schoenomyza dorsalis, Loew.
Cænosia verna, Fabr.
Cynomyia cadaverina, Desv.
Myospila meditabunda, Fabr.
Pollenia rudis, Fabr.
Lonchoptera punctum, Meig.
Lonchoptera lutea, Panzer.

The determinations of the species, included in these lists, were made for me by Mr. D. W. Coquillett, through the kindness of Dr. Howard. It has, until recently, been almost impossible to get satisfactory determinations of our smaller species of Diptera, and the foregoing lists are good illustrations of the constantly increasing value, to the workers in applied entomology, afforded by the Department of Insects at the U. S. National Museum.

The University of the State of Missouri is to send an Entomological Expedition into Southern Mexico this summer. It will be in charge of Prof. J. M. Stedman, head of the Entomological Department, and will have for its object the making of a biological (largely entomological) survey of the region from Vera Cruz on the Gulf, which is in perpetual tropics, to the top of the volcano Popocatepetl, which is far above the perpetual snow line, and down to Acapulco on the Pacific. This will give all the temperature variations from perpetual tropics to perpetual snow, and will allow of the study of life zones under conditions not to be found elsewhere in North America. The collection will become the property of the University, which is to furnish half the expenses, the other half to be borne by Prof. Stedman.

THE COCCIDÆ OF THE IVY.

BY GEO. B. KING, LAWRENCE, MASS.

In Entomological News, Vol. V., 1894, p. 210, Prof. Cockerell cited all of the *Coccids* known to infest ivy *(Hedera)*. Since then other species have been found, and with his consent I have prepared the following notes for publication. Leaves of *Hedera helix* sent to Prof. Cockerell from Brazil, coll. Dr. F. Noach, May, 1893, proved to be infested by *Chrysomphalus dictyospermi*, Morgan. And Mr. A. Hempel, of St. Paul's, Brazil, sent *C. aonidum*, L. Just recently he wrote me that *C. dictyospermi*, var. *jamaicensis*, Ckll. *(minor*, Berlese), was received by him from Lord Walsingham, infesting ivy at Cannes, France. *Aspidiotus rapax (camelliæ)* was found by E. E. Green on ivy in Ceylon (Coccidæ of Ceylon, p. 44). *Dactylopius citri*, Risso., was found at Kew Gardens, England, on a variety of ivy called *Hedera amurensis* (Newstead, Ent. Mo., May, 1897, p. 73). The following have been found by me at Lawrence, Mass.: *Aspidiotus Crawii*, Ckll., on ivy in a greenhouse, and must have been there for some time, as the vine is an old one, supposed to be about 20 years old. *Lecanium hesperidum*, L., is frequently found on ivy in greenhouses, but not in sufficient numbers to cause much alarm. *Dactylopius citri*, Risso., and *Aspidiotus hederæ*, Vall., seem to be the most troublesome, sometimes covering the entire leaves of the vine, and as the leaves are used very extensively in making up wreaths and other floral designs, their presence in greenhouses causes very much damage. A list of the species now known to be found on ivy is appended below:

1. *Phenacoccus hederæ*, Sign., Hab. France.
2. *Lecanium maculatum*, Sign., Hab. France.
3. *Lecanium hesperidum*, L., Hab. France and N. America.
4. *Asterolecanium hederæ*, Licht., Hab. France and Italy.
5. *Dactylopius citri*, Risso., Hab. England and N. America.
6. *Aspidiotus rapax (camelliæ)*, Hab. Ceylon.
7. *Aspidiotus hederæ*, Vallot, Hab. Algeria and N. America.
8. *Aspidiotus Crawii*, Ckll., Hab. N. America.
9. *Chrysomphalus aonidum*, L., Brazil.
10. *Chrysomphalus dictyospermi*, Morg., Brazil.
11. *Chrysomphalus dictyospermi*, var. *jamaicensis*, Ckll., France.

All of the above species, except the first two, have been cited by many authors under various names. The following are some of them :

Lecanium hesperidum, L.—*L. lauri*, Boisd., perhaps is the same.

Asterolecanium hederæ, Licht., was described as *Planchonia hederæ*, and again re-described as *Planchonia Valloti* Licht., and probably *Asterolecanium massalongianum*, Targ., is the same.

Dactylopius citri, Risso., has the following synonyms : *destructor*, Comst.; *farinosus*, Deg.; *phyllococcus*, Ashm.; *brevispinus*, Targ.

Aspidiotus rapax, Comst. Synonyms : *camelliæ*, Sign.; *citri*, Comst.; *evonymy*, Targ.; *lucumæ*, Ckll. and Town.

Aspidiotus hederæ, Vall.—For a long list of supposed synonyms of this species see Prof. Cockerell's first supplement to the Check List of the Coccidæ, 23 in all, after Berlese and Leonardi.

Aspidiotus Crawii, Ckll.—I retain this as being a valid species, although Mr. Marlatt finds it to be *A. cydoniæ*, Comst. He may find something else on the leaf or twig than is indicated by the label, and should not assume that the writer of the label saw it and confused it with the species indicated. Two are more species are often found upon the same leaf and twig. Aulacaspis elegans, Leon, found by me on *Cycar revoluta* in a greenhouse at Lawrence, Mass., had mixed with it on the same leaf *Aspidiotus hederæ*, Vall. Neither can the proportional number be estimated, by any means, by those found on a slide mount.

Chrysomphalus aonidum, L., as *Coccus aonidum*, L.; *Chrysomphalus ficus*, Ashm., and *Aspidiotus ficus*, Ashm.

C. dictyospermi, Morg., as *Aspidiotus dictyospermi*, Morgan, and *C. dictyospermi*, var. *jamaicensis*, Ckll. (*minor*, Berlese).

DESCRIPTION OF A NEW SPECIES OF HÆMATOPINUS.

BY HERBERT OSBORN, COLUMBUS, OHIO.

Hæmatopinus columbianus, n. sp.

Head longer than broad, semicircular in front, wider and more depressed behind the antennæ, rostrum projecting ; antennæ located in front of the middle of the head, the first joint large, deeply set in the border of the head, second joint the longest, third, fourth and fifth nearly equal, fifth slightly smaller ; a strong bristle is borne on the postero-lateral angle. The pronotum is short, rather narrow, and the sternal plate is very broadly ovate, almost circular, but the sides posteriorly tapering slightly

and the posterior border obtusely rounded or subtruncate. The second and third pairs of legs are nearly equal and considerably larger than the anterior pair, and their tarsal claws are broad and blunt or obtuse at tip. The abdomen is elongate, segments one to seven with prominent chitinous processes at margin; long stiff hairs are scattered rather sparsely over the disk and along the margins. Length of ♀ 1.20 mm., ♂ .75–.80 mm.

This species approaches *montanus*, Osb., in form, but is narrower and smaller. It differs also in the form of the sternal plate.

Described from a number of specimens taken from the Columbian Spermophile, *Spermophilus columbianus*, at Pullman, Washington, by Prof. C. V. Piper, in July, 1896. Type material in the U. S. National Museum.

BOOK NOTICE.

Systema Lepidopterorum Hildesiæ (Second Part).—Phylogeny and Definition of the Families of the Butterflies. With genealogical tree and plate of neuration. Mittheilungen aus dem Roemer Museum, Hildesheim, April, 1900. By A. Radcliffe Grote, A. M.

The author divides the diurnals into two series or superfamilies, Papilionides and Hesperiades, and twelve families, giving diagnoses of the divisions. The classification is phyletic, and takes into consideration the facts of the scanty record from fossil material. As a result of these studies six larger associations of butterfly forms of general distribution are recognized, and as many smaller groups, inhabiting a restricted territory, and giving evidence in most cases or being survivals of once more extensive complexes. The nomenclature has been reviewed, and the author hopes the work may conduce to conformity in the treatment of the butterflies in literature.

Dr. A. Fenyes, of Pasadena, Cal., started on a collecting trip to the Atlantic Coast on the 1st of June, and will return to Pasadena in October.

Dr. W. Holland is to resign his position as Chancellor of the Western University in Pittsburg, the *Dispatch* of that city hears, to become Director of the Carnegie Museum.

Mailed June 30th, 1900.

(See page 225.)

The Canadian Entomologist.

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NEW NOCTUIDS FROM BRITISH NORTH AMERICA, WITH NOTES ON SOME OTHERS.

BY JOHN B. SMITH, SC. D., RUTGERS COLLEGE, NEW BRUNSWICK, N. J.

Of late years a few collectors have been sending material from various points in Western Canada, Manitoba and British Columbia. Mr. Dod at Calgary, Mr. Hanham at Winnipeg, and Mr. Heath at Cartwright, have collected many interesting species. Dr. Fletcher has sent me examples from other collectors in the same general region, so that we have now some little basis for a judgment as to the general character of the Noctuid fauna.

Within a comparatively small area, species from the Atlantic and from the Pacific Coast regions occur. The body of the species are of the Rocky Mountain series, but there is a strong admixture of forms occurring in Maine, in Northern New England, and even in Labrador. Extending westward, toward and into Vancouver, comes a decided Pacific Coast or Californian type, with an addition, the extent of which is yet uncertain, of characteristic forms. Quite a number of species which at first sight seem like well-known eastern forms, prove, on closer study of large series, to be distinct, and most of the new species that have of late reached me have been from this region or from the adjacent States of Washington and Oregon.

All the species here described are taken in British America, and, with one exception, have not thus far been taken in the United States.

In the accompanying plate are photo-engraved reproductions of the

new species and of a few others taken in the same general district, but elsewhere described.

Anytus obscurus, n. sp.

Deep, bluish gray, washed with smoky so as to obscure all the markings. So far as the latter are visible, they agree with *privatus*, save that the lines are much more even throughout. There are no contrasts anywhere, and the connecting streak between the median lines is not traceable in the specimen before me. The ordinary spots are barely defined. Secondaries a little smoky throughout, not unlike some female *privatus*. Beneath, dull, smoky. The thoracic tufts are less obvious than in the other species, and the insect as a whole seems less robust.

Expands 36 mm. = 1.44 inches.

Habitat: Edge Calgary, VIII., 21 (Dod).

A single male, in fair condition. This is undoubtedly distinct from *privatus*, all the maculation being lost in the very deep ground, though retaining the characteristics of the eastern form so far as they are traceable. The male genitalia are obviously distinct from the others of the genus, though remaining of the same type.

Anytus profundus, n. sp.

In all essential points of ornamentation like *privatus*: but very much darker, blue-gray and black. Head and thorax blackish with a seal-brown tinge, the black line on the collar scarcely contrasting. The primaries have the median space blackish filled above the narrow black streak connecting the median lines, and the ordinary spots are thereby obscured and made indefinite. The t. p. line is distinctly more even, the points on the veins being much less prominent, and the inward tooth in the submedian interspace being much less marked. Terminal space almost uniformly dark smoky brown. Secondaries with clearer white and black contrasts than in the eastern species, and this difference holds also on the under side.

Expands 37–40 mm. = 1.48–1.60 inches.

Habitat: Brandon, Manitoba (Hanham).

It may be perhaps a question whether this is really a good species or a geographical race of *privatus*. They are nearly related, no doubt; but I am inclined to consider them distinct: not only because of the colour

and ornamental differences, evident though they are, but because the male genitalia show a slight, though constant, difference in form, and a very decided one in size, the eastern form having the harpes much larger and stouter.

Two males are at present before me, and Mr. Hanham has other specimens similar in appearance.

Mamestra negussa, n. sp.

Ground colour mouse-gray, varying a little in the amount of reddish shading. Head usually a little paler; but else no maculation. Primaries with the usual maculation all present; but nothing at all relieved or contrasting. Basal line geminate, included space a little paler, extends to the internal vein, inwardly toothed on the cell. T. a. line geminate, included space a little paler, inner portion often lost, outer brown or blackish, as a whole with a rather even outcurve, a very little toothed on the veins, tending to become distant from base so as to narrow the median space. S. t. line geminate in the costal region, else mainly defined by the slight contrast between median and s. t. spaces; when there is no such contrast the line is practically lost or marked by venular dots only. In course it is sinuate, incurved below the cell. S. t. line pale, a little irregular, in light specimens mainly defined by the darker terminal space. A series of very small, black, terminal lunules, which may be wanting. Fringes narrowly cut with pale and with a pale line at base in light specimens. Median shade obscure, outwardly oblique from costa between the ordinary spots, darkening the reniform inferiorly, then close to t. p. line, somewhat deepening the shade of the outer portion of median space. Claviform small, barely traceable or altogether wanting, a trifle paler in dark examples. Orbicular oval, oblique, of good size, varying a little in form, pale ringed and usually altogether a little paler. Reniform moderate, kidney-shaped, tending to enlarge a little inferiorly and there dark filled; narrowly pale ringed. Secondaries smoky, basally a little paler, with a dark discal lunule, a blackish terminal line and pale fringes. Beneath gray, powdery, with a smoky or blackish shade line hardly beyond the middle, and a discal spot on all wings.

Expands 37–40 mm. = 1.48–1.60 inches.

Habitat: Calgary, Canada, mouth of Fish Creek, on Sallows, May 1, 4 and 14 (Mr. F. H. Wolley Dod).

Two males and two females. Mr. Dod was good enough to send me these specimens because they seemed to him—justly enough, as it proved—different from *gussata*, which flies with it. The chief superficial difference is that the new species lacks all the black marks of the older form. There is no basal black streak, no black margined claviform and no black line to the t. p. line. The antennæ of the male are brush-like—*i. e.*, the joints are a little produced laterally and furnished with tufts of bristly hair.

Hadena cerivana, n. sp.

Head, thorax and abdomen a very pale dull gray, more or less tinged with red, especially in the female. Patagiæ with a blackish shade at base of primaries, else head and thorax immaculate. Primaries with all the normal maculation fairly well written, but not contrasting; much better marked in the female. There is a distinct, irregularly thickened black basal streak, extending about half way to the t. a. line, and this is the most contrasting bit of maculation in the wing. Basal half line geminate on costa, outer portion lost, inner brown or blackish, a little irregular. T. a. line geminate, outer portion blackish, inner tending to become lost, as a whole rather evenly outcurved, only a little drawn in on the veins. T. p. line geminate, outer portion even, smoky, tending to become lost in the outcurve over cell, inner portion blackish, tending to become lunulate, drawn in below cell, close to or actually touching inferior angle of the reniform. S. t. line irregular, concolorous, marked on costa by a darker preceding patch which fills the s. t. space, thence by a narrow, broken, brownish preceding shade, the terminal space sometimes darker in whole or in part. A series of black, distinct, terminal interspaceal lunules. Median shade line smoky, oblique between the ordinary spots, thence close to and parallel with the t. p. line, never prominent, usually obvious, rarely almost obsolete. Claviform very short, blackish or brown edged, tending to become obsolete. Orbicular large, a little paler, narrowly edged with black scales, tending to become incomplete above. Reniform rather large, kidney-shaped, tending to become a little constricted in the centre, partly black edged, incompletely pale annulate, inferiorly dusky filled. Secondaries smoky, in the female with a somewhat paler, more reddish tinge. Beneath powdery, disc of primaries a little darker, all wings with more or less obvious darker extra median lines and obvious discal spots.

Expands 34–38 mm. = 1.36–1.52 inches.

Habitat: Calgary, Canada, in June (F. H. Wolley Dod).

Four males and four females, the latter on the whole a little more reddish shaded. There is little difference between the specimens, and altogether they differ from *finitima*, with which I was at first inclined to consider them identical, by the much paler ground and much less contrasting maculation. There is a mere shade of red and the median space is hardly darker. Antennæ a little marked in the male with small tufts of short lateral bristles.

Nephelodes pectinatus, n. sp.

Ground colour luteous, with tendency to either a greenish or a decidedly red tint. Head and thorax immaculate. Primaries without defined markings, the median space deeper in colour, all beyond it more smooth, not powdery like the basal space. T. a. line single, oblique, a little outcurved, hardly darker than ground. T. p. line single, a little better defined, outcurved over cell, evenly oblique below. S. t. line marked by a narrow, broken, obscure darker preceding shade. Orbicular an undefined, somewhat paler, round blotch. Reniform a little better marked, paler, not outlined, defined only below and outwardly. Secondaries smoky or blackish, the fringes of the palest ground colour of primaries. Beneath reddish powdered, primaries with disc smoky, secondaries with a discal lunule.

Expands 38–42 mm. = 1.52–1.68 inches.

Habitat: British Columbia; Corfield, Vancouver.

Two males (the collectors not indicated on the labels). The species resembles the common eastern form, and so I have named it for more than one of my Northwestern friends, I believe; but more careful study shows a difference in the character of the male antennæ. In *minians* the pectinations are rather short and lengthened by a curved bristle at the tip. In *pectinatus* this bristle is absent, but the branches themselves are longer and a little enlarged toward the tip. The differences are thus obvious and emphasize the rather scant superficial characters. The specimen from British Columbia has a peculiar greenish tinge to the ground which I have not seen in the eastern species. That from Vancouver is washed with red-brown. It is probable, therefore, that quite a range of colour difference will be found, as in the case of the eastern form.

Cosmia punctirena, n. sp.

Ground colour rather bright luteous, with blackish or reddish powderings, so that in some cases a specimen will be almost all smoky, and in another it will seem, and actually be, red. Head and thorax without markings. Primaries powdery, the median lines darker, single, obvious in all cases and distinct in most. Basal line single, a little diffuse, not prominent. T. a. line single, oblique from the costa, forming an obtuse, more or less rounded angle in the submedian interspace. T. p. line single, forming rather an even and not very great outcurve from costa to inner margin. Median shade obvious, sometimes prominent, usually a little diffuse; extends obliquely from middle of costa to inferior margin of the reniform, forms there a rectangle and then runs parallel with the t. p. line. S. t. line of the ground colour, more or less relieved by the powderings on each side, and by a preceding shade on the costa. Terminal space usually a little dusky. A series of more or less obvious interspaceal, terminal lunules. Orbicular round or nearly so, of good size, concolorous, ringed with darker scales, sometimes barely traceable. Reniform of good size, kidney-shaped, more or less obviously outlined by a darker line, concolorous except for a dusky spot inferiorly, which is always present, even when nothing else of the spot is traceable. Secondaries yellowish, silky, sometimes with a reddish flush, with a narrow, scarcely defined, median line. Beneath yellowish, more or less powdery, all wings with an outer line and a discal spot.

Expands 37–44 mm. = 1.48–1.76 inches.

Habitat: Glenwood Springs, Colorado, September (Dr. Barnes); Yellowstone Park, Wyoming, August (Dr. Barnes); Cartwright, Manitoba (Mr. Heath).

Four males and one female, all in fair condition, and no two alike. Taken as a whole, this is a somewhat smaller form than found in the east, and not nearly so bright nor so sharply marked. Yet its markings are practically identical, save that the new form has, in all the examples before me, a blackish spot in the reniform, inferiorly, which is not present in any examples of *paleacea* (= *discolor*, Wlk., = *infumata*, Grt.) now before me. In one specimen the median space is darkened between the median and t. p. lines, making an obvious, broad band.

A male specimen from Santa Barbara Co., California (Coquillett),

may belong here; but is much undersized, as if a little crippled, and the antennæ seem a little more bristled.

Xanthia pulchella, n. sp.

Head and thorax a rich yellowish brown, the patagiæ tending to a deeper, somewhat purplish tinge. Beneath, the body parts are brighter, more rusty brown. Primaries have a beautiful, velvety texture, the colour varying from purplish to yellow brown. Basal and s. t. spaces as a whole purplish, the latter more intense. S. t. space contrastingly yellowish brown, the median space reddish luteous, with an olivaceous shading which tends to a gray on the costa. The ordinary lines are distinct and are accompanied by rich, deep brown shades, the t. p. line forming a broad band. The inferior margin of the reniform is white, contrasting, and the whole wing is thus characteristically beautiful. Basal line whitish, margined each side with a deeper brown shading. T. a. line outwardly oblique, irregular, pale, outwardly margined by a distinct, broad, deep brown line, inwardly edged by somewhat darker scales. S. t. line pale marked on the costa, then lost in a broad band which fills the outer fourth or more of the median space, darkens the upper portion of the reniform, forms the usual outcurve over the cell, and is a little incurved below. S. t. line marked by the contrast between terminal and subterminal spaces, and preceded by a rich deep brown shade, best marked on the costa, then gradually narrowing and, in one specimen, lost before the inner margin is reached. Orbicular narrow, irregular, oblique, outlined in pale, not in any way contrasting. Reniform upright, rather narrow, the upper portion decidedly broader, filled with rusty red, the lower portion prominently outlined in white. Secondaries smoky, with a purplish or yellowish brown tinge, an outer marginal band somewhat paler, the discal spot obvious, though not prominent. Beneath rusty red, shaded with scarlet or purplish, powdery, the outer margin of primaries paler. Secondaries even or a little paler toward base, with an obvious discal lunule.

Expands 30 mm. =1.20 inches.

Habitat: Livingston, Vancouver, IX., 14; British Columbia.

One male and two females; one of the latter defective. This is one of the prettiest of our Noctuids and utterly different from our eastern form. It is much closer to some of the European species, and belongs to

the exceptional series containing *vulpecula* and *citrago*, in which the ordinary lines are defined and the maculation is not blotchy. I have seen two or three other examples, all from the same general region, one of them in the Strecker collection.

Drasteria conspicua, n. sp.

Head, thorax and body smoky black, more or less covered with gray scales and hair; under side almost whitish. Head usually whitish in front. Collar gray or yellowish at base and tip. Patagiæ gray edged. Abdominal rings narrowly edged with yellowish. Primaries smoky, overlaid by bluish-white or gray scales, variable in depth, the markings smoky brown or blackish, contrasting. Basal half line marked on costa only. T. a. line outwardly oblique, inner margin nearly even, edged by paler, more yellowish scales. From the costa to the median vein the line forms a narrow band; below that point it broadens out into a blackish fascia, somewhat extended outwardly on the median vein and along the inner margin, so that the outer edge of the fascia is deeply indented. T. p. line forms a broad fascia, a little angulated on vein six, extending only to the middle of the submarginal interspace, pale edged at both margins. S. t. line of the ground colour or paler, preceded by a blackish shading, which may be partly obsolete; but is always marked on the costa, where a conspicuous, smoky patch, emphasized by two large black spots, practically fills the s. t. space. Usually the shading is also marked on the inner margin, extending a variable distance toward the costa and sometimes reaching it. There is a series of black, terminal lunules. Orbicular a small black spot in undefined paler shading. Reniform smoky, obscure, not outlined, chiefly marked by the median shade which ends there. Secondaries pale straw yellow to reddish luteous; shaded with black basally and with a black discal lunule. There is a black median band, a black s. t. band and a black terminal band which includes the white-tipped fringes. All the bands are narrow, resembling some forms of *Synedia*. Beneath whitish to straw-yellow, all wings with a black discal spot, a defined black median band, a smoky or black s. t. band which is diffuse inwardly, and a narrow black terminal band.

Expands 27–31 mm. = 1.08–1.24 inches.

Habitat: Calgary, Canada, May and June.

Seven examples, four males and three females, all in good condition, from Mr. F. H. Wolley Dod, who sent it as separate from *distincta*,

which also occurs there. The species is so well marked that it cannot be mistaken, and the range of variation is not great. The maculation of primaries is a reduced copy of *orobia*, much more distinct, but, in the banded secondaries, generic habit is abandoned and the form is unique. The antennæ of the male have the joints marked, laterally furnished with tuftings of ciliæ. There is no difference in markings between the sexes.

EXPLANATION OF PLATE 5.

1.—Xanthia pulchella, n. sp. Vancouver, British Columbia.
2.—Mamestra negussa, n. sp. Calgary, Canada.
3.—Xylomiges pallidior, Smith. New Westminster, B. C.
4.—Anytus profundus, n. sp. Brandon, Manitoba.
5.—Nephelodes pectinatus, n. sp. British Columbia; Corfield, Vancouver.
6.—Cosmia punctirena, n. sp. Cartwright, Manitoba; Yellowstone Park, Wyo.; Glenwood Spgs., Colo.
7.—Carneades Lagganæ, Smith. Laggan, B. C.
8.—Noctua inopinatus, Smith. Brandon, Manitoba.
9.—Carneades holoberba, Smith. Calgary, Canada.
10.—Hadena cerivana, n. sp. Calgary, Can.
11.—Drasteria distincta, Neum. ♂. Calgary, Can.
12.—Drasteria distincta, Neum. ♀.
13.—Drasteria conspicua, n. sp. ♂. Calgary, Can.
14.—Drasteria conspicua, n. sp. ♀.

All the photographs were made from actual type specimens, except 11 and 12.

ERRATUM.—In Mr. Grote's article on "Types of Noctuid Genera," page 210, after line 18, insert:

Virtually, through Guenée's action in 1852, nictitans became the type of Hydrœcia. Therefore there can be no question of suppressing Helotropha. The validity of the genus Hydrœcia depends upon that of nictitans, as affording a distinct generic type. The "scientific configuration," as introduced and left by Guenée of Hydrœcia, is most unsatisfactory. In any throwing together of the species the whole genus should be called Gortyna, Ochs., 1816, type G. micacea, as held by me from the first until the last.

NORTHWEST (CANADA) ENTOMOLOGICAL SOCIETY.—It is gratifying to learn that a grant of $25 per annum has been made to the Society by the Territorial Government "in view of the valuable services rendered to the public in directing the attention of farmers in rural communities to the economic phase of entomology." This official recognition will be a great encouragement to the members of the Society.

NEW HISTORIES IN HYDRŒCIA.

BY HENRY BIRD, RYE, N. Y.

The summer of 1899 was a remarkable one at Rye in the abundance of Hydrœcia larvæ, as four species, never before noted in their larval state, and which do not seem to have their early histories described, were observed. Old acquaintances were to be found on every side, and some hitherto very uncommon ones were so abundant that a word in the matter of cause and effect may not be amiss. The seasonal conditions are, of course, contributive to such good results; still, the numbers in evidence every year suggest our looking a little further. Briefly, the environments are most propitious for the development of these borers, as that most important question, food supply, can be relied upon being adequate to all demands. The proximity to salt water insures a copious dew-fall, so that vegetation in the months of July and August does not suffer from the usual drought of this season in any such manner as it does farther inland. Here in late midsummer the larger Compositæ and other thick-stemmed plants are in full splendour, while fifty miles back from the coast all may be parched and leafless. So with a vigorous plant-growth assured, our friends are able to exercise their fondness in clinging to familiar haunts, and year after year we can be sure of finding a colony in the same particular location. While noted for their preference to certain places, there are a number of causes more or less evident which frequently make them leave the plant of their first selection, and it is under such circumstances that another stem close at hand is so important to their welfare. Water draining into their galleries may have something to do with this move; still, that cannot apply in all cases, and this trick of seeking pastures new is very general to all species. With the ordinary leaf-feeding caterpillar this might be accredited to mere instinctive vagaries of one sort or another, but for a larva to forsake a commodious burrow that has taken the greater part of its existence to make, and which still seems to offer all the requisites for its well-being, is harder to explain. However, the fact remains, and no doubt plays an important part in the mortality of a brood, so an abundance of food plant close at hand is a great factor in the ultimate results, as without it a certain percentage would surely starve. Evidences of the effect of this prodigality not only arise from the numerous forsaken galleries we encounter, but the number of dwarfed and evidently starved-out adults found when they make their flight is very

perceptible. Much attention has always been given to the fatalities affecting this group, on account of the long series of specimens desired, so that any causes frustrating this end have been regarded with apprehension, and have been investigated as far as possible. (See CAN. ENT., Vol. XXX., 126.)

In studying larval conditions, the close relationship existing between the species makes attention to minor details of structure necessary. Applying a general description to these larvæ, we would note their bodies being very cylindrical and provided with sixteen legs. The head is moderate in size, well rounded, slightly bulging, with clypeus evident; is usually a shining brown, and marked laterally with a black, somewhat oblique, line or dash. Mouth-parts are strong and compact. The thoracic shield is a conspicuous feature, often as wide as the head, and, in being a hard corneous plate, offers the protection needed here in a boring insect. The anal plate is also large, and defends this extremity. The various setæ arising from the tubercles and borders of the plates are exceedingly weak, and scarcely discernible except by using a lens. From being so minute, and not quite assured of their constancy, particular reference to them does not seem important.

In the matter of coloration, all agree in their earlier stages in having whitish dorsal, subdorsal and partial substigmatal lines contrastingly drawn on a dark brown or purplish body colour. These lines become less distinct at each subsequent moulting, and are lost, or nearly so, at maturity, when the colour becomes an undecided translucence of a slightly varying hue, which is affected somewhat by the kind of food plant eaten. With most species there is an abrupt termination to the lines, excepting usually the dorsal, on the first four abdomidal segments, and sometimes on the last thoracic segment also. This gives an appearance at once noticeable, but only occurs up to the next to final change, when any contrasting colour effects are generally lost. For illustration see CAN. ENT., Vol. XXIX., pl. 6, where *purpurifascia* is shown in next to last stage.

For comparison of tubercle arrangement, these creatures form ideal subjects. These latter are large, corneous, often shining black, and always strongly defined. On thoracic joints two and three, I. a, I. b and II. a are small; II. b, III. and IV. are very large, the most conspicuous of any of the lateral ones, and are situated in the form of an equilateral

triangle. On the abdominal segments, tubercles I. and II. are placed in the usual oblique setting, with III., III. a, IV. and V. clustered about the spiracle. The eighth abdominal segment has I. and II. very large parallel to the dorsal line, and with their opposites form the corners to a conspicuous square. Preceding the anal plate on last segment is a lesser plate or tubercle that occasionally becomes merged into the borders of the former.

On the seventh abdominal segment, IV. is sometimes raised to a little above the line of the spiracles instead of lower down as is common to Noctuids generally.

Dr. Dyar has pointed out this feature as occurring in *purpurifascia*, and in theorizing on the unusual break, concludes it has been an acquisition —or, rather, a transposition— to more fully protect the spiracle. (Jour. N. Y. Soc., VII. 70.) A curious and perhaps significant fact is that this break occurs in the root-feeders alone, at least so far as observations have been made. Such larvæ, burrowing down to the extremities of roots, are at all times cramped for room, and are rarely able to turn round in their galleries when desiring to go in a reverse direction.

Can it be that this habit, which necessitates the constant backing of the larva to the ground orifice for the disposal of frass, and which practically means as much backward as forward movement, is accountable for this? With the stem borers there is generally an extended burrow of ample diameter; if they wish to go in a reverse direction there is room for turning, and we may assume a forward motion predominates. Certainly the excess of backward movement made by the former would bring an undue amount of friction behind the spiracle on joint seven, and tubercle IV. has been raised to the point of greatest efficiency, the same as it is on the other segments. This is merely a random idea, of thin air consistency perhaps, and is advanced only that attention may be directed here more fully.

In dealing further with larval characteristics, it may be noted that there is a tendency on thoracic segments two and three for the skin to assume a puckered or roughened aspect, most notable in immature stages, especially when the head is retracted. Inflated examples show this invariably when but little air-pressure has been exerted in drying.

The extensile, glandular process that exudes from the under side of joint one does not seem to have been mentioned previously. It consists

of a cylindrical sack, slightly bulbous at the extremity, and in length equals or exceeds the thoracic feet. Just what function it may fulfil is at present uncertain.

For brevity in treating the following species, the application of these points on larval structure is implied; the variations from the usual form will alone be noted.

I have lately had the pleasure of examining the allied European *micacea* and *Ochria flavago* in various stages of their larval existence. The former is a counterpart of our *immanis*, and shows some typical departures from the larvæ here considered. *Flavago* is very near in general appearance to *cataphracta*, and the larval similarity is closer still. That the clypeal structure of the moth should differ so much seems odd, and may be due to the borer not displaying sufficient instinct to make an exit aperture, so that the moth must necessarily develop a clypeal spur to pierce its way out through the epidermis of the food-plant in some such manner as do the similarly armed *Nonagria*. It will be a matter of some interest when our *Gortyna* (*Ochria*) *Buffalonensis* is again located, and its history worked out so that comparisons may be made here.

If *Hydræcia* are so given to acquiring peculiarities due to special wants or differing environments, it becomes evident the more light we can throw on their full histories the better we shall be able to ultimately associate them.

The following early histories do not appear to be published:

Hydræcia marginidens, Gn.

Late in June this species was found boring in *Cicuta maculata*, the first specimen noted being high up in the plant, three feet or more above ground. Its discovery happened through a little of that detective work one learns in this branch, and which adds such a charm to the labour that might otherwise seem rather arduous. For it is with clues and not the culprits we have first to deal, and as these creatures are concealed at all times, it is no easy matter locating them. A suspiciously broken twig or withering stem, a knotty swelling, or a ventilating aperture, is usually the evidence we have to work upon: hence the satisfaction when a well-directed search, prompted by some slight symptom, discloses an *Hydræcia*. Attention was drawn to the *Cicuta* through a few inches of the top having fallen down to one side, hanging black and withered. The larva had worked upward so far that the diameter of the stem was wholly

disproportionate to its appetite, and the thin walls had finally collapsed. At all times a voracious feeder, it at last finishes its career at the base of the plant, often boring down and out through the tuberous roots. These latter are said to be the most poisonous productions of our local flora, yet *marginidens* flourish upon them to a surprising degree, becoming at maturity fat, uncanny "grubs," we might almost say, from which it would be little expected that such beautiful moths should ultimately result. Then, too, there is the unfortunate, unnecessary habit of leaving the burrow and pupating in the ground. There is a tinge of regret connected with this statement, as it recalls the slip given me by the scores of larvæ that had been located after a great amount of patient searching. The harvest of pupæ, upon which it was anticipated a finger could be placed at the proper time, was not to be mine; in its stead, experience of the usual expensive nature.

A note of August 4 reads: "After examining dozens of plants that had contained larvæ, but which had now left for pupation, one chrysalid, evidenly stung, is found in a burrow, an irregular opening for the moth to get out having been made. Nearly all seem to have eaten down through the roots, going out at the lower end and apparently burrowing downward still, as though impelled by a desire of making some celestial acquaintances. No pupæ being found in the vicinity of the roots or elsewhere, we shall have to reserve our revenge for the brood of next year."

On June 30, larvæ were in the second stage from the last. The colour is a light brown, with a decided pinkish tinge. The first four abdominal segments are much the darkest by reason of the subdorsal and substigmatal lines being here discontinued. The dorsal line is very evident on all segments; these lines yellowish white; tubercle arrangement already very conspicuous and normal; on all abdominal joints I. exceeds II. rather more than it does later. Lateral tubercles darker and more contrasting than the dorsal. Head, shield and plate pale, testaceous; the shield as wide as head, and edged with black at the side. Length 1.2 inches. Next to last stage: A marked gain in length is noted, the colour has faded, head and shield are more shining and conspicuous. Length 1.5 inches; duration of stage ten to twelve days.

Last stage: All colour contrasts lost, and appearance anything but prepossessing. The soiled translucent colouring, which darkens perceptibly on first four abdominal segments, seems due to the internal fluids.

Head is shining russet, showing the black oblique side line; width .12 inch. Thoracic shield rather exceeds the head in width, very noticeable. Anal plate is not large for this group. Tubercles moderate, and being dark or blackish, are easily definable. On seventh abdominal joint IV. is low down as is customary with larvæ not strictly root-feeders. Full-fed examples attain a length of 2 inches. Duration of stage, thirteen days, with the one specimen noted. Although *Cicuta* is unquestionably the preferred food plant in this locality, note has been made of an odd specimen found in *Rumex*, and it has been found boring *Cosmos* in Maryland.

The pupa is robust for the group; colour a dark shining chestnut. Viewed dorsally, a slight constriction is seen at the base of the wing-covers. Between the segments the shell is minutely pitted. The usual delineations of head, legs, etc., are ordinary. Length one inch; duration of period about twenty days.

Hydrœcia cerussata, Grt.

For a number of years past the knowledge of early history and food plant of this species had been a coveted bit of information. Like the good things that are said to come to those who patiently wait, this finally came our way, and quite extended observations were made of the last two larval stages as well as the subsequent transformations.

The species had been taken at light years ago, but seemed only periodic in appearance and altogether to be classed as a rarity. Last season was certainly not an "off year" with them, as there were a great abundance of larvæ, but they unfortunately left their burrows for pupation. This habit, shared with the preceding and some others, is a serious drawback to the collector and may merit investigation.

Can we call this a departure from the usual habit of the group—that of changing in their burrows, or is it only the retention of the more normal hereditary condition—that of a transformation in the ground? The roaming period so noticeable in full-fed larvæ immediately before the pupal change begins, must with *Hydrœcia* be limited, for the season is drawing to a close and quick transformations are imperative. We may assume they become early influenced by the lethargy of the approaching change, and if this comes on so quickly that they succumb to its influence before the roaming tendency predominates, it is only natural that the galleries, as being the first place at hand, should serve as sufficiently safe

quarters for the change. In this case an exit aperture for the moth must be made and the provisional instinct here called forth is certainly a departure from the usual preparatory action taken by larvæ. The ample orifice through the plant-stock and the lid at the epidermis to screen against intruders are good examples indeed of insect forethought. That *cerussata* and *marginidens* do not undergo their changes in conditions which bring out such a display of instinct would hardly place them on a lower plane, and we may look for a cause from some other source, being anxious to find an excuse for these beauties.

Having a habitat that extends further southward than the other local species gives them a longer season, so that on becoming full-fed there may seem less haste for the change to a chrysalis, and they might indulge in a little roaming. After once leaving their burrows, we cannot expect them to find their way back again, so refuge is sought in mother earth.

Upon encountering the larva of *cerussata*, it is easy to see at once that we have to deal with a species differing greatly from the conventional form. The head is larger, the plates stronger and the tubercles seem more clustered, together with a parchment-like cuticle, giving the insect quite an armoured appearance. And it is needed! The food-plant is *Vernonia noveboracensis*, and if anyone doubts the aptness of the common name "ironweed" as applied to this plant, it would be well for them to investigate the roots, for it is here the borer works. It would be well to take some heavier tool than a penknife or garden trowel when undertaking the task.

Larvæ in next to the last stage were found July 15. The plants had been entered a few inches up from the base and a gallery started downward into the roots. Progress was slow on account of the extreme toughness of the stem. A very noticeable swelling is produced, but instead of increasing in diameter as the plant continues to grow, finally bursts open for its entire length, making an ugly scar, at once furnishing a clue for the hunter. From this time on that part of the burrow offers no shelter whatever and the workings below ground proceed slowly. Often the borer misses the centre of the stem, for be it known there is no pith to guide it, and eats its way through to the outside. Then the gallery is continued through the soil and tangle of fiberous rootlets; but this does not occur until near maturity.

Next to last stage: Very cylindrical, the skin more roughened and

drawn on the thoracic joints than with other species. The colour is a purplish brown, showing very dark on first four abdominal segments. The ordinary lines on the thoracic joints are a pure white, their continuation on the last four joints show as soiled and yellowish. Head is large, very finely granulated, of a chestnut colour; width .13 inches. The cervical shield is larger than usual in this stage, a hard shining plate of a shade lighter than the head, and has the ordinary black edging. The anal plate is at once unique, and offers perhaps the strongest point of specific distinction. Instead of being similar in texture and colour to the shield, its surface is plainly roughened or granulated; colour deep black, and its area consumes about all of the dorsal space on the last segment. What is usually a separate plate preceding the anal one on this segment, is in this case one confused area. The few setæ that arise from the borders of this plate are stouter than with other species. The tubercle arrangement is of the conventional form, the lateral ones clustered around the spiracles, and all, together with the last-named organs, are intensely black. Special mention may be made of IV. on abdominal joint seven as being raised a little above the line of the spiracles, a feature that holds with all that are strictly root-borers. On the next to last joint I. and II. are very large and with their opposites are merged into a conspicuous quadrate patch, which, preceding the unusual anal plate, gives a very protected look to this extremity. Length of insect 1.6 inches; duration of stage uncertain, perhaps fourteen days.

Final stage: The bulk and diameter now greatly increase; colours become more translucent; head and shield become heavier and darker, the former now measuring .17 inches across. Thoracic legs stout and shining black. The crochets of the abdominal feet are very strong, and although no microscopic comparisons have been made here, it is safe to say these are better developed than in the other species treated.

Tubercle arrangement remains the same, though I. and II. are perhaps less conspicuous. Large examples measure slightly over two inches in length. When full-fed they become very restless, in captivity at any rate, boring in and then out of the earth at frequent intervals, for a couple of days prior to the final rest.

The pupa is correspondingly large and robust, of a dark brown, much less shining than ordinary. The shell appears thicker, as there seems no difference in hue even when the imago is ready to burst forth. Cremaster

is blunt and hardly shows bifidate. Extreme length 1.1 inches. Moths appear Sept. 5 to 12.

It certainly means a great deal of work bringing through examples of this species, but the thrill of delight and admiration experienced when beholding the freshly-emerged insect will, we predict, be an ample compensation. Unfortunately, the beautiful plum-bloom purple of the two species so far discussed, fades more or less brownish after awhile, no matter what pains be taken to keep the specimens from any exposure to light, so that it is really necessary to breed them in order to fully appreciate these insects.

Cerussata is very fond of leaving its burrow when in the larval state, which may be explained in part by the curious splitting that the stem undergoes and which makes a kind of trough leading any dew or water directly in on the insect below. So there is cause, perhaps, for a change; but in case of isolated plants it means a serious fast and probably the substitution of some other plant as food. Such an instance had surely occurred with my first example from pupa secured some years ago, when an exceedingly dwarfed specimen emerged from a random lot of pupæ gathered in Rumex and all supposed to be common *cataphracta*.

[TO BE CONTINUED.]

SOME NOTES ON "THE CAMBRIDGE NATURAL HISTORY, VOL. VI."

BY O. W. BARRETT, MUSEO C. G. E., TACUBAYA, MEXICO.

On page 365, Dr. Sharp states that the Hesperid larva "frequently forms a rudimentary cocoon." It does not appear to be generally known that *Dolores Mexicanus*, Feld., a Hesperid (near *Eantis*) common to Central Mexico, makes a decidedly complicated cocoon. Constructed of tough gray silk, and very closely woven, the cocoon is formed between two leaves (or, rarely, two sides of one folded leaf) of the "zapote blanco" (*Casimiroa* sp.), and suspended from a twig by a strong silk thread 70 mm. to 90 mm. in length. The mouth is closed by an exceptionally well made *chevaux-de-frise* and turned at nearly right angles to the axis of the cocoon, which is 33 mm. in length, and at the middle, 13 mm. in breadth by 9 mm. in thickness.

The larva, after entering the cocoon, as well as the pupa during its

entire existence, has the habit of frequently turning and shaking itself so as to produce a rattling noise, which has given it the popular name of "campanita" (little bell); on opening one side of the cocoon the large head of the larva or the front portion of the pupa may be seen in rapid vibration striking the walls of its chamber.

In several dozens of these cocoons I can observe no variation in the plan. No parasites noticed. Am ready to furnish specimens to those who desire a real "butterfly cocoon."

On page 397 it is remarked that "we believe they (Hepialidæ) never fly to light." I have taken *Phassus triangularis*, H. Edw : *P. argentiferus* Walk., and a species of *Hepialus* at light, though rarely. As the body of *Phassus* is commonly 65 mm. in length, and the wings proportionately narrow and clumsy, I would suggest that the large Hepialids may venture on only short flights.

The eggs of *Phassus triangularis* are minute (0.3–0.5 mm.), very numerous, and of a gray or blue colour at first, turning to brown or black ; and since they appear to be devoid of any glutinous coating, it is probable that the female merely drops them among the underbrush, trusting in the safety of numbers.

Under the new family Eupterotidæ (p. 376), the author touches on the irritating properties of the larval hairs, and on the habit of nest-building. The hairs of *Metanastria psidii*, Saile, are barbed at the tip and very irritating, in the same way as those of *Hadisidota propinqua*, H. Edw., but contain no poison. The nests of this Eupterotid on (*Quercus jalapensis* are conspicuous objects in some districts, being frequently 3 to 5 feet in length. No true cocoon is made, the larva pupating in a suitable space in the home nest. The larva is nocturnal in habits, and yet it is parasitised by an Ichneumon.

Under the Saturniidæ (p. 372), Dr. Sharp mentions the ocellate marks on the secondaries of species of the genus *Automeris*. It appears that these markings have a protective value, as all the species with which I am acquainted have the habit when disturbed, of raising the primaries (so as to expose the large glaring "eyes"), and holding the secondaries at "present arms" until the fright is over.

The cocoon of at least several species of *Automeris* has a quasi-hinged grating in its front portion, which opens only outwardly : the front is closed, but with very weak (brittle) silk.

The author also speaks of the beautiful colours and the spine-bearing tubercles of the Saturniian larvæ. The larva of *Copaxa multifenestrata*, H. Sch., is the most strikingly beautiful I have seen. In *Automeris janus*, Cr., the spine defense system is carried to an extreme ; the length of the profusely branching spines is 15 mm. to 25 mm., or twice the diameter of the body, and so abundant that the larva looks like a bunch of moss a few yards away ; while the quantity of poison contained in these spines is so great that during the process of inflating, the fumes which are driven off with the vapour are positively dangerous to the operator.

ON THE NORTH AMERICAN SPECIES OF CHOREUTIS AND ITS ALLIES.

BY PROF. C. H. FERNALD, AMHERST, MASS.

About fifteen years ago I obtained from Dr. O. Staudinger a series of all the species placed under the Choreutidæ in his Catalogue of the Lepidoptera of the European Fauna (1871), and made a critical study of their structure to aid in the arrangement of our North American species. This study also led me to look up the nomenclature of these insects, and the results are given in this paper.

There has been a growing tendency for some time to use the generic names proposed by Hübner, and while at first I was not inclined to adopt the genera in his Tentamen, I now feel compelled to do so. It is not necessary to argue this question, since both sides were so ably presented years ago in this journal.

Hübner, in his Tentamen published in 1806, proposed the name *Hemerophila* with *pariana* the only species under it, and we must therefore consider it the type. The genus *Simæthis* was established by Leach in the article "Entomology," published in Brewster's Edinburgh Encyclopedia in 1815, with *dentana*, Hüb., for the type. This Encyclopedia was re-published in Philadelphia in 1816. I have not seen the Edinburgh edition, but understand that the American edition now before me is a reprint, at least so far as the article "Entomology" is concerned. *Dentana*, Hüb., which is a synonym of *oxyacanthella*, L., is congeneric with *pariana*, Cl. Ic., and therefore *Simæthis* must fall as a synonym of *Hemerophila*. Hübner published the genus *Guaris* in his Verzeichniss, p. 374, with *albertiana*, Cram., *swederiana*, Stoll., and *kleemanniana*, Cram., under it. As *albertiana* seems to have been the only one of these

species known to Hübner, I am of the opinion that it should be regarded as the type of *Gauris*. Hübner has given an excellent figure of this species under the name of *Hemerophila perlæta Albertiana* in his Sammlung exotoscher Schmetterlinge, Vol. I., pl. 213 (1823). Zeller, who studied several examples of this species with his usual care, placed it in the genus *Simæthis*. We may therefore regard *Gauris* as a synonym of *Hemerophila*.

Hübner established the genus *Choreutis* in his Verzeichniss, p. 373, with five species under it, all of which, except *diana* and *scintilulana*, Hüb. (a synonyn of *myllerana*, Fab.), are congeneric with *pariana*, and have been placed with it under *Simæthis*, which may now be replaced by *Hemerophila*. The last species, *myllerana*, has been taken as the type of *Simæthis*, while *diana* has been placed with *oxyacanthella*, L., and its allies, but its structural characters differ so much from the others that I feel justified in following Guenee, who separated it and established the genus *Orchemia* for its reception.

Immediately following *Choreutis*, on the same page of the Verzeichniss, Hübner established the genus *Porpe*, with only one species under it, *fibrana* (a misprint for *vibrana*, Hüb.), and as this species is congeneric with *myllerana*, *Porpe* must fall as a synonym of *Choreutis*.

It was shown by Dr. Scudder in his "Historical Sketch of the Generic Names Proposed for Butterflies," p. 96 (1875), that although the title page of Hübner's Verzeichniss bears the date of 1816, there was internal evidence sufficient to prove that it was not all published at that time. I have only concerned myself with the time of publication of the part containing the Microlepidoptera. There is a reference on page 312 to the Third Century of the Zutrage, the introduction to which is dated Aug. 27, 1825, but this page is in a signature which begins on page 305. The Third Century of the Zutrage, on page 34, makes reference to page 294 of the Verzeichniss, but this page is in a signature which ends with page 304. I therefore conclude that the first 304 pages of the Verzeichniss were published *before* Aug. 27, 1825, and the pages following, *between* this date and the time of Hübner's death, which occurred Sept. 13, 1826. It is barely possible that this part of the Verzeichniss may have been published late in 1825, but as Hübner himself made no reference to it in August, it seems more probable that it could not have been prepared and published before Jan., 1826, and therefore I have adopted

1826 as the date of publication of that part of the Verzeichniss occurring after page 304, the part including the Microlepidoptera.

SYNOPSIS OF THE GENERA.

1. { Veins 7 and 8 of fore wings forked ..... *Orchemia.*
   { Veins 7 and 8 of fore wings not forked ..... 2.
2. { Third segment of palpi short and blunt ..... *Hemerophila.*
   { Third segment of palpi long and pointed ..... 3.
3. { Second segment of palpi with long bristles beneath ..... *Choreutis.*
   { Second segment of palpi without long bristles beneath ..... 4.
4. { Antennæ thickened with scales along the middle above ..... *Walsinghamia.*
   { Antennæ not thickened with scales ..... 5.
5. { Palpi slightly curved up ..... *Brenthia.*
   { Palpi curved up close to the front ..... *Setiostoma.*

Genus ORCHEMIA, Guen., Ind. Meth., p. 58 (1845).

Head smooth, scarcely rounded in front: labial palpi medium, slightly curving up in front, second segment a little roughened beneath, the scales at the end forming a tooth pointing obliquely down and forward; third segment enlarged with scales at the outer end similar to the second segment; proboscis short and scaled basally; ocelli present; antennæ about half the length of the costa, ciliate in the male, simple in the female; thorax smooth; hind tibiæ with long scales along the upper side and middle, and hind tibiæ thickened with scales at the middle and end.

Fore wings ovate or somewhat triangular, with twelve veins, 1 with a long fork at the base, 7 and 8 forked, the others separate. Hind wings a little wider than the fore wings, with 1 b forked at the base, 3 and 4 forked or from one point, 7 and 8 connected by an oblique vein near the basal fourth of the wing. Median vein not pectinate towards the base above.

ORCHEMIA DIANA, Hüb.

Tortrix diana, Hüb. Sam. Eur. Schm. Tort., Pl. 44, Fig. 247 (1823).

Choreutis diana, Hüb. Verz. Schm., p. 373 (1826).

Simæthis diana, H.-S. Sch. Eur., Vol. V., p. 94, Pl. 38, Figs. 257–261 (1839).

Coccyx decorana, Zett. Ins. Lap., 982 (1840).

Simæthis diana, Zell. Isis, Vol. 30, p. 208 (1846).

Amphisa luridana, Walk. Cat. Lep. Het., 28, p. 318 (1863).

Expanse of wings, 15-17 mm. Head, thorax and fore wings green, the latter with the first cross line dark brown or black, much thicker on the costa and giving off two outward angles. Second line gives off an acute angle beyond the cell and another on vein 2. Both of these lines are bordered more or less widely with white or greenish-white and more or less diffused. The median shade is represented by a dark brown angulated line from the cell to the hind border, but this is often obscured by the white shade on this part of the wing. Hind wings uniformly dark fuscous. All the fringes dark fuscous, but with a lighter streak through the middle.

I have long had this species in my collection from American localities, having received it from Halifax, N. S.; White Mts., N. H., and I also took several specimens in June, 1877, at Orono, Me., in an open pasture. Walker described it from St. Martin's Falls, under the name of *Amphisa luridana*. I have also a dark variety of this species from Prof. C. P. Gillette, taken in Colorado

The early stages and food plant are unknown, but Hartmann states that he found it on the wing near Munich in June and July between a pine forest and a juniper. The pasture in Orono where it was taken had more or less juniper *(Juniperus communis)* scattered over it, and was by the side of woods containing pine, spruce and other evergreen trees, but as there were many other kinds of plants in the immediate vicinity, I do not think this at all conclusive or even hardly suggestive concerning the food plant of this insect.

Genus HEMEROPHILA, Hüb., Tentamen (1806).

Head smooth and rounded; labial palpi medium, slightly curving up in front, strongly roughened beneath, third segment short and blunt; proboscis present, short and scaled at the base; ocelli present; antennæ half the length of the costa or a little more, simple in the female, ciliated in the male. Thorax smooth, hind tibiæ hairy along the upper side, middle and hind tibiæ thickened with scales at the middle and end.

Fore wings ovate or somewhat triangular, with acute apex and twelve separate veins: 1 with a long fork at the base; 2 arises from the outer third of the median vein, 3 to 12 arise at nearly equal distances from each

other, 7 ends in the outer margin and 8 in the costa a little before the apex, 11 arises from near the basal fourth of the subcostal vein; cell closed and with the superior and inferior cellular veins both present, but difficult to distinguish. Hind wings ovate, with eight veins, three internal veins present, 1 b forked at the base, 2 beyond outer fourth of median, 3 and 4 stalked, base of stalk and 5 and 6 arising nearly equidistant, 8 free from the base of wing, cell closed, with two cellular veins very indistinct, median not hairy above towards the base.

The only species under this genus occurring in North America so far as known at present is *vicarialis*, which Zeller described and published in the Verhandlungen der k.k.zoologisch-botanischen Gesellschaft, p. 322 (1875), giving the habitat "Maine or Massachusetts." This species is unknown to me.

Genus CHOREUTIS, Hüb., Verz., p. 373 (1826).

Head smooth, with the front sloping; labial palpi with the first and second segments armed beneath with long bristles, those of the second segment collected into four tufts nearly as long as the segment itself, the third segment slim and pointed, about as long and but little larger than the tufts on the under side of the second segment; proboscis short; eyes medium, hemispherical; ocelli present; antennæ about two-thirds as long as the costa, ciliate in the male, simple in the female; thorax smooth, hind tibiæ hairy along the upper and lower sides; middle and hind tibiæ thickened with scales at the middle and end; abdomen untufted; uncus present, claspers large.

Fore wings oblong ovate, with metallic markings; twelve separate veins, 1 with a fork at the base about one-third of the length of the vein, 2 arises from the outer fourth of the median, 3 to 5 usually arise nearly equidistant from each other, though in some species 3 and 4 arise from one point or very near each other, and 5 and 6 are more remote than the others, 11 arises from the basal third of the subcostal, superior and inferior cellular veins generally visible. Hind wings ovate, with eight veins, 1 b forked at the base, 2 arises from the outer fourth of the median, 3 and 4 stalked or coalesced, 5, 6 and 7 arise nearly equidistant, 7 from the upper angle of the cell, 8 free, from the base of the wing; cell closed, with two very indistinct cellular veins, median not hairy above towards the base.

SYNOPSIS OF THE NORTH AMERICAN SPECIES.

1. { Basal third of fore wings white ..... *leucobasis.*
   { Basal third of fore wings not white ..... 2.

2. { Fore wings with metallic markings green ..... *inflatella.*
   { Fore wings with metallic markings not green ..... 3.

3. { Two yellowish stripes across the outer part of fore wing .. *virginiella.*
   { No yellow on outer part of fore wings ..... 4.

4. { Two clear white stripes across the fore wings ..... *onustana.*
   { Without clear white stripes across the fore wings ..... 5.

5. { Base of fore wings marked more or less with yellow .. *bjerkandrella.*
   { Base of fore wings not marked with yellow ..... *occidentella.*

C. BJERKANDRELLA (Thunb.). Dis. Ent. Ins. Suec., I., p. 24, Pl. 3, Figs. 23, 24 (1784).

silphiella, Grote, Pap., I., p. 40 (1881).

gemmalis, Hulst, Tr. Am. Ent. Soc., Vol 13, p. 148 (1886).

soroculella, Dyar, CAN. ENT., Vol. 32, p. 86 (1900).

Var. a. *pretiosana*, Dup., Hist. Nat., IV., p. 182, Pl. 65, Fig. 9.

australis, Zell., Isis (1847).

Habitat.—Ill., Mo., Tex., Cal., Ore., and Europe.

Food.—In Europe, *Inula salicina*, *Inula dysenterica; Helenium; Cardaus crispus; Carlina acaulis; Veronica.* In America, *Silphium interrifolium* (Coquillett).

Miss Murtfeldt sent me the following notes on this species :

"The larva is found late in June (in Missouri), and again in October, mining and webbing the leaves of *Gnaphalium polycephalum*. When small it works chiefly between the cuticles of the leaves, but later feeds externally, spinning quantities of somewhat viscid web, among which the black powdery frass is profusely scattered.

"The mature larva is 6 mm. in length by 1.5 in diameter across middle segments, from which it tapers very slightly in both directions; form cylindrical, sub-moniliform. Colour translucent, whitish green, immaculate. Head oblique, same colour as body, but horny and polished. Collar inconspicuous. Legs concolorous with general surface. Before the first transformation it becomes gregarious, the larvæ spinning their dense white sticky cocoons, something to the number of a dozen in close proximity in the general web.

"Pupa pale golden brown, 4 mm. in length, and rather stout, with no especially marked characters.

"Imagines in seven or eight days after pupation.

"In Central Missouri the species is rather rare, and, within the limits of my observation, has only occurred three times within the last dozen years, although careful watch for it has been maintained upon its food plant. So far it has not been found upon any *Gnaphalium* or *Antennaria*, except G. POLYCEPHALUM. I have never taken this species at light."

C. INFLATELLA (Clem.), Proc. Ent. Soc. Ph., Vol. II., p. 5 (1863); Tineina of N. A., p. 209 (1872).

Dr. Clemens states that he described this species from a "single specimen taken on the wing in July," presumably at Easton, Pennsylvania. The type of this species has probably been lost, as I could not find it in the collection of Dr. Clemens, now owned by the Am. Ent. Soc. I would not be greatly surprised if it should prove to be a variety of *bjerkandrella*.

C. OCCIDENTELLA, Dyar, CAN. ENT., Vol. 32, p. 86 (1900).

I have long had this species in my collection under the name of *Choreutis coloradella*, and had so named it for others, but had not published a description of it, so that Mr. Dyar's name will hold. His type is in poor condition, else he would probably have recognized that it was the same as my *C. coloradella*, specimens of which I had sent to the National Museum.

Choreutis extrincicella, Dyar, seems to be a badly-faded specimen of the above. After a careful examination and comparison of the single type specimen with all the material before me, I should not feel justified in considering it a distinct species.

C. ONUSTANA (Walk.). Cat. Lep. Het., 30, p. 996 (1864).

Habitat.—Nova Scotia; Amherst, Mass.

C. LEUCOBASIS, n. sp.

Expanse of wings 10 to 12 mm. Head, thorax and base of fore wings pure white. Outer two-thirds of fore wings dark fuscous or reddish brown, with an oblique, white costal streak before the apex, and two others of the same colour, but much smaller, on the costa between this and the white base of the wing. Outer part of the wing more or less overlaid with white scales, so dense beyond the cell as to fuse and form a distinct whitish patch. There are numerous clusters of metallic scales

scattered over the outer part of the wing, some of which form a curved line around the apex on the border, and there are two large clusters of them resting on a black ground between the white patch and the fold. Fringes reddish brown.

Hind wings and upper side of abdomen fuscous. Under side of all the wings fuscous, with the white costal spots reproduced, and there are several whitish cross lines on the under side of the hind wings. Under side of the body white. Legs white, annulate with black.

Described from four specimens, two from London, Ontario, and two from Massachusetts. This species was figured by the late Townend Glover in his unpublished work on N. A. Lepidoptera, Pl. 83, Fig. 21.

C. VIRGINIELLA (Clem.). Proc. Ent. Soc. Ph., 3, p. 505 (1864); Tineina of N. A., p. 257 (1872).

Habitat.—Va., W. Va., Penn.

BRENTHIA, Clem. Proc. Ac. Sci., I., p. 172 (1860).

Head smooth and rounded: labial palpi moderately longer, slender, smooth and pointed, slightly curving up in front, the terminal segment being shorter than the second. Proboscis very short and slightly scaled. Eyes oval and rather prominent; ocelli present, large. Antennæ simple in the female, but rather densely ciliated in the male, about half the length of the costa.

Fore wings ovate, with rounded apex and twelve separate veins: 1 with a long fork at the base, 2 from very near the angle of the cell, which is closed and extends to near the middle of the wing; cross vein convex on the outside; 10 arises from the upper angle of the cell and 11 from the subcostal before the middle. Hind wings somewhat triangular, with eight veins: 1 b furcate at the base, 2 from near the end of the cell, which is closed and scarcely reaches to the middle of the wing; 3 and 4 from a stem which arises from the lower angle of the cell, 5, 6 and 7 nearly equidistant and parallel, 8 arises free from the base of the wing.

B. PAVONICELLA, Clem. Proc. Phil. Ac. Sci., p. 172 (1860); Tineina of N. A., p. 134 (1872).

Microœthia amphicarpeœana, Cham. CAN. ENT., Vol. X., p. 76 (1878.)

Habitat.—Penn., Ill., Kan., Tex., W. I., Panama; Brazil.

Food.—Amphicarpæa monoica (Chambers).

WALSINGHAMIA, Riley. Proc. Ent. Soc., Wash., I., p. 157 (1888).

W. DIVA, Riley. Proc. Ent. Soc., Wash., I, p. 158.

Habitat.—Florida.

Food.—Ficus.

W. SLOSSONIA, n. sp.

Expanse of wings, 15 mm. Head, palpi, antennæ and thorax dark brown, with metallic reflection in certain lights. Fore wings dark brown, with a straight band across the middle, on each side of which a considerable portion of the wing is abundantly sprinkled with whitish scales, which are arranged into very fine cross lines near the band, but more irregularly toward the outer edge, which is more oblique than the outer margin of the wing. The basal and outer portion of the wing beyond the white sprinkled area, and the cross band except a black edge on each side, are changeable in colour when seen at different oblique angles, from deep violet to bright metallic red or flame colour, or golden yellow; in fact, the play of colours under a lens is quite remarkable. Fringe at the base concolorous with the adjacent part of the wing, dark fuscous on the outer part. Hind wings and abdomen above and beneath, and the under side of the fore wings, dark fuscous brown. Legs dark fuscous brown, with the first three segments of all the tarsi white at the base.

Collected at Biscayne Bay, Florida, by Mrs. Anna T. Slosson, for whom I take very great pleasure in naming this insect.

SETIOSTOMA, Zell. Verh. der k. k. Zool.-Bot., Ges., p. 324 (1875).

Head smooth and rounded; labial palpi curving up in front, closely scaled, third segment quite long, smooth and pointed. Proboscis short and scaled at the base. Ocelli present. Antennæ simple in the female, a little more than half the length of the costa.

Fore wings oblong ovate, with twelve separate veins, the cell extending three-fourths the length of the wing: 1 with a long fork at the base, 2 and 3 from before the end of the cell, 4 and 8 from the two angles of the cell, 5, 6 and 7 arise from the cross vein about equidistant from each other. Hind wings somewhat triangular, with 7 veins: 1 b furcate at the base, 2 from the outer fourth of the cell, 3 from the lower angle, 4 wanting, 6 and

7 forked, the stem of which arises from the upper angle : 8 free, from the base of the wing.

S. XANTHOBASIS, Zell. Verh. der k. k. Zool.-Bot., Ges., p. 325 (1875).

Habitat.—Fla., Tex., Ill.

The following notes on this species were kindly sent to me by Miss Mary E. Murtfeldt, who bred it at her home in Kirkwood, Missouri:

"The larva of *Setiostoma xanthobasis* was collected September 27th, 1890, on a variety of *Quercus stellata*. It fastened two leaves together flatly, but not with the surfaces closely applied—the web under which it was feeding, which was irregularly circular and about ¾ of an inch in diameter, being curiously 'boxed' on the margin, 1-5 inch in height where the two leaves were furthest apart. Within this fence it was feeding upon the parenchyma of the under surface of the leaf, rejecting even the smallest veins.

"At the date mentioned it seemed to be about full-grown, and may be characterized as follows: Length 15 mm., diameter 3 mm.; form subdepressed, broadest across thoracic segments. Colour, a dull, watery, somewhat livid green, mottled with dull crimson—ventrally as well as dorsally. Abdominal segments marked on dorsum with two broad, irregularly outlined, longitudinal streaks, connected by a transverse, slightly curved crimson line. Piliferous spots and hairs inconspicuous.

"Head short, thick, pale brown, with central spot of dark brown. Cervical collar narrow, covering only one half of the first segment, horny, pale brown.

"Anal plate triangular, horny, pale brown. Thoracic legs pale brown. Prolegs similar in colour to general surface.

"On Oct. 15th, after a period of ten days' quiescence, this larva left its neat case between the leaves and spun up in an inconspicuous, tough little cocoon under the folded edge of one of the leaves.

"Imago appeared May 15th, 1891."

S. FERNALDELLA, Riley. Proc. Ent. Soc., Wash., I, p. 155 (1888).

Habitat.—Los Angeles, Cal.

Food.—Quercus agrifolia.

NEW NORTH AMERICAN ORTALIDÆ.

BY CHAS. W. JOHNSON, PHILADELPHIA, PA.

Pyrgota Chagnoni, n. sp.

♂.—Head reddish, vertex reticulated with brown, cheeks and occiput yellowish, antennal foveæ brown; antennæ yellow, thorax and scutellum red; numerous fine brown specks are so arranged as to form two obsolete dorsal lines and two spots on each side divided by the suture; this character is especially noticeable when looking from the head toward the scutellum, and gives the disc of the thorax a rugose appearance. Abdomen narrow, brownish, shining, posterior margins of the second, third, fourth and sides of the fifth segment more or less blackish. Halteres yellow. Legs variable in colour, with thick black hairs, especially on tibiæ, anterior and middle coxæ, basal half of all the femora and tibiæ, and all except the terminal joint of the tarsi yellow; posterior coxæ and the terminal portion of the femora reddish; outer half of all the tibiæ and the terminal joint of the tarsi blackish; the outer portion of the posterior tibiæ is intensely black, while the black of the anterior tibiæ is due largely to long thick hairs. The wings can best be described by reversing that of *P. valida*, Harris, given by Loew (Monog., Pt. III., p. 75). The whole surface of the wing has a rather uniform yellowish-gray tinge, variegated by numerous irregular, more or less confluent, maculations of a dark brown colour; at the apical portion of the wing the markings become more united, forming a noticeably darker area; the dark markings are also more prominent at the junction of the second and third longitudinal veins and along the small cross veins; in the costal and marginal cells the markings are larger and subquadrate; the costal, auxiliary and basal half of the first and second longitudinal veins, yellow, the others dark brown. Length 14 mill.

One specimen of this handsome species was collected by Mr. Gustave Chagnon, on Montreal Island, Canada.

Stenopterina bicolor, n. sp.

(*Stenopterina*, n. sp., Proc. Acad. Nat. Sci., Phila., 1895, p. 337.)

Head reddish brown, with short yellow pile; above the base of the antennæ, the bottom of the antennal foveæ and mouth-parts, blackish; orbits narrowly margined with light yellow pubescence; vertical triangle surrounding the ocelli reddish-yellow; antennæ reddish. Thorax dark metallic blue, with short yellow pile; humeri and the area extending from

the antealar protuberance around the base of the wings to the posterior angle and across the posterior portion of the mesonotum, and the scutellum, reddish; metanotum bluish, but on each side reddish. Abdomen metallic blue, with short yellowish pile. Halteres and legs reddish-yellow. Wings brownish, costal cells, the middle portion of the submarginal cell along the third longitudinal vein, basal third of the large basal cell, and the two smaller basal cells, yellowish; a small spot near the outer end and a line near the base of the discal cell, central portion of the first and all of the second and third posterior cells, the anal cell and alula brownish hyaline. Length 13 mill.

Two specimens, one of which is in the collection of the University of Kansas, were collected by the writer, at St. Augustine, Florida.

Rivellia floridana, n. sp.

(*Rivellia*, n. sp., Proc. Acad. Nat. Sci., Phila., 1895, p. 337.)

Head reddish, orbits narrowly margined with silvery-white; antennæ yellow. Thorax and scutellum red. Abdomen, first and second segments reddish, the others black; halteres reddish; legs yellow. Wings hyaline, veins yellow; crossbands brown or brownish yellow, and wider than *R. variabilis* and allied species; the first and second bands are very narrowly connected at the junction of the auxiliary and first longitudinal vein, second and third coalesce at or just below the fourth longitudinal vein (in the latter case there is a very small hyaline triangle, formed by the two bands and fourth longitudinal vein), and end in a point at the posterior margin near the junction of the fifth longitudinal and transverse vein; here also the first band obscurely coalesces with the first and second; the fourth or apical band narrowly separated or more narrowly connected with the third at the tip of the second longitudinal vein. Length 5 mill.

Four specimens were collected by the writer on Dayton Island, Lake George, Florida, May 9, 1894.

DESCRIPTION OF TWO NEW SPECIES OF TABANIDÆ.

BY JAMES S. HINE, OHIO STATE UNIVERSITY.

The limits of the subgenus Atylotus as restricted by Osten-Sacken are not easy to determine. The presence or absence of the ocelligerous tubercle is the character which gives most trouble, for in some species it seems to be absent in the female and present in the male, and one could convince himself without a great amount of imagination that in some species it is present in one specimen and absent in another of the same sex. The type of the subgenus is *bicolor*, and associated with it are other equally peculiar species whose characters place them at once in Atylotus. They are small forms in which the usual banding of the eyes is lacking, as are also the frontal callosity and subcallous. The wings are glassy, transparent, resembling those of some other Tabanids when teneral.

The following species of the group appear to be undescribed :

Tabanus pruinosus, n. sp.

Length 10 mm. Colour black, opaque, the whole body having a pruinose appearance.

Female. — Front yellowish pollinose, clothed with rather short yellowish hair ; frontal callosity, subcallous and ocelligerous tubercle wanting ; face and cheeks yellowish pollinose and clothed with long white hairs ; palpi whitish ; antennæ yellowish, the first section of the third joint of medium width, gently convex below and prominent above ; eyes pubescent, unicolorous ; thorax dull black, clothed with long white hairs ; wings hyaline, marginal cell dilute yellowish ; coxæ and bases of all the femora black, tips of tarsi brown, remainder of legs yellowish ; dark hairs on all the legs have a tendency to make the legs appear dusky ; abdomen black, very sparingly red on the sides of the first two segments, and clothed with light hair, which usually is shorter than on the thorax.

Male. —Differs from the female in having the abdomen more broadly red on the sides—extending back on to the third segment.

Five males and three females taken in central and northern Ohio in June.

Tabanus thoracicus, n. sp.

Length 9 mm. Thorax gray pollinose, abdomen piceus, yellow on the sides.

Female.—Front yellowish pollinose, clothed with short yellow hairs ; frontal callosity and subcallous absent, occiput gray, face and cheeks yellowish gray pollinose, clothed with rather short hairs, some of which appear dark, almost black from some views ; antennæ yellow, first section of third joint narrow, as compared with *bicolor*, gently convex below, prominent above ; thorax gray, clothed with white hairs ; legs yellow ; all the femora darker at base, but this colouring is most apparent in the middle pair ; last joint of all the tarsi brown, tibiæ and tarsi clothed with dark hairs, wings transparent, marginal cell and some of the longitudinal veins yellow ; abdomen above piceous, yellow on sides of the first four segments ; below a narrow, piceous stripe is present on the first three segments, on each side of this stripe the first two segments are plain yellow, and the apical part of the abdomen is variegated with piceous and yellow.

Male.— Differs from the female in having the basal half of all the femora dark, and less yellow on the venter of the abdomen.

Two females and a male collected at Oswego, N. Y., in August ; the property of the National Museum.

This species differs from *bicolor*, to which it is most closely related, in its colour, smaller size and more slender form, and in the striking difference in the form and width of the third antennal joint of the female.

Mailed August 2nd, 1900.

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THE LARVÆ OF DONACIA PISCATRIX, LAC., AND CRASSIPES, FAB.*

BY E. DWIGHT SANDERSON, NEWARK, DEL.

Though the larvæ and life-histories of several species of the *Chrysomelid* genus *Donacia* have been described more or less fully by European entomologists, I have been able to find but one such note in American entomological literature. In 1877 Dr. A. S. Packard gave a brief description of the larva and life-history of *Donacia cincticornis*, Newm., var. *proxima*, Kby., in the report of the U. S. Geological Survey for that year (p. 806), together with figures of the larva and cocoon (Pl. LXX., figs. 17-19) which he found on the roots of *Nuphar advena*.

Recently I have been fortunate in being allowed to study the Chrysomelid larvæ in the collection of the U. S. National Museum, and among them was glad to find several species of this genus and *Haemonia*, which with it form the tribe *Donaciinæ*. Specimens of eggs, larvæ and pupæ of *Donacia piscatrix* and larvæ of *Haemonia nigricornis* are both present from the Detroit and St. Clair Rivers, collected, I judge, by Messrs. Hubbard & Schwarz, and larvæ of *D. semicuprea*, *D. crassipes*, and *H. zosteræ* from Europe. The larvæ of *Donacia piscatrix* and *crassipes* I have found so very similar that they may be described together without mentioning the minute points of difference.

Several very distinct or typical shapes exist among Chrysomelid larvæ, which to a certain extent are characteristic of different tribes. Such are (1) the short, inflated larvæ of Chrysomela and its allies; (2) the case-bearing Cryptocephalinæ and Clythrini, with their recurved

*Read before the Entomological Society of Washington, May 3rd, 1900.

abdomens and long legs ; (3) the flattened, elongate larvæ of the leaf-eating Gallerucini and Halticini, which also always possess anal prolegs ; (4) the very elongate, cylindrical root and stem mining forms of the last mentioned tribes : (5) the thin larvæ of the Hispidæ, with their flat, wedge-shaped heads, rudimentary legs (though sometimes apodous) and abdomen deeply serrated laterally ; and (6) the Cassidæ with their sharp, spine-like lateral tubercles and long fæcifork bearing its mass of excrement over the body.

The larvæ of the Donaciinæ have, however, a form quite distinct from any of these, though resembling most closely - as in many other respects—the Criocerini, which in turn are nearest the Chrysomelini. The body is nearly cylindrical, and forms a distinct, even arc. The head is from one-third to one-half the width of the prothorax, into which it is more or less sunken. The body gradually enlarges to the sixth and seventh abdominal segments, and then tapers abruptly caudad. *D. piscatrix* is 13 mm. long by 3.75 mm. across the sixth abdominal segment, the head being .66 mm. wide and the prothorax 1.5 mm. The segments and folds are quite sharply distinct.

The coloration is that common to most subterrestrial larvæ, the body being a yellowish-white, and the head, articulations of the legs, spiracles, and plates upon the eighth abdominal segment, dark brown.

Just behind each antenna are found four small black ocelli, and another occurs below it. The antennæ are about 0.1 mm. long, and are peculiar in that the accessory digit borne at the apex of the second segment is longer than the third. The latter bears two small digits and a stout long seta at its apex. Upon the basal segment are three small ocelli-like structures occurring commonly on most Chrysomelid larvæ. They do not seem to be the bases of broken setæ, but as to what they are or their function, I am ignorant. Possibly they are sensory pits.

The labrum is irregularly rectangular in outline, and rather large, being about .12 mm. broad. The anterior emargination common in all the nearly related genera is indicated by markings, but has become closed and almost obsolete. The setæ are unusually stout.

The mandibles of Chrysomelid larvæ are typically five-dentate, though many variations occur, and many of the Eumolpinæ are entire. In Donacia only the two outer teeth are developed, the three inner ones being represented by the serrated inner edge in *D. crassipes*, though apparently

entirely lost in *piscatrix*. A comparison with the mandibles of *Haemonia* and *Crioceris* brings out this degeneration quite clearly.

The maxillæ are very highly specialized and entirely different from those of any other Chrysomelidæ. The cardo is unusually large (.15 mm.), being nearly one-half the whole length (.35 mm.), while the stipes is proportionately shorter. The palpus consists of the usual four segments, which are but obscurely defined; is rather stout, and between .15 and .2 mm. long. But the most peculiar feature of the maxilla is the relation of the lacinia and galea. In most Chrysomelid larvæ the lacinia is rudimentary or merely represented by a stout chitinous process, or spine, at the inner base of the galea, though in many of the Gallerucini and others it is as large or larger than the galea. Usually the galea is composed of a large curved sclerite, articulated to the stipes just mesad of the palpus, with its outer face on the under side of the maxilla, but so curved that at its tip it is concave on the mesal side, appearing like a hood to the small lacinia, and surmounted by numerous stiff setæ. In *Donacia* the galea seems to have faced around until its concave inner face opens directly ectad. It is surmounted by a long thin concave, transparent process, nearly the length of the last three segments of the palpus, being either a single highly specialized seta, or a number of them grown together. The inner chitinous margin of the stipes is decidedly produced at the base of the lacinia. From it project two chitinous bands nearly to the tip of the galea. At this point it is articulated to them by a socket joint, a long, stout, concave, chitinous, sword-like process, about .1 mm. long, which is encased within the sheath-like process arising from the galea. Between the chitinous bands forming the anterior margin, the base of the lacinia, and the galea, is a hollow space. At the apex of this, just below the articulation of the two processes, is a small oval mass, whether muscular or chitinous I am unable to determine, which seems to be connected to the base of the chitinous bands of the anterior margin. In the cavity of the inner chitinous process are seen two slender, whitish filaments or threads, and though they could not be traced for their entire length, they seem to arise from this oval mass, immediately below. The most plausible explanation of the use of this curious contrivance seems to be that it is used for piercing the tissues of the food plants, though this is entirely a matter of conjecture.

The labium is rudimentary, and the palpi are mere papillæ of a single segment .02 mm. or .03 mm. in length, with no trace of another segment

or palpiger, though the anterior margin of the mentum is clearly defined.

There are no true tubercles upon the thoracic or abdominal segments, the setæ thickly studding both dorsal folds of each segment laterad nearly to the spiracle, caudad of which is an area covered with setæ. On the ventral aspect are five areas of setæ, the central one being composed of two areas coalesced upon the mesal line.

Many European writers have described the larvæ of Donacia as having but eight segments, but as Schmidt-Schwedt has pointed out, the ninth and rudimentary tenth are easily recognizable and are very clearly seen in the last embryonic stage, as shown in the figures of Kolliker. Indeed, the latter figures show two long, filiform, lateral appendages attached to each of the ninth and tenth segments. In Lema, Crioceris, and one or two other genera, the anus is found opening in the ninth abdominal tergite, but in Donacia it opens at the caudal margin of the seventh tergite, and true tergites of the eighth and ninth segments are wanting, this space being but slightly chitinized and containing no true sclerites.

But the most striking feature of the *Donacia* larvæ is the pair of brown, chitinous, sickle-like appendages borne upon the eighth abdominal segment. These are about .5 to .66 mm. in length and reach nearly to the tip of the abdomen. For many years the function of these organs was somewhat of a puzzle to those European entomologists who had studied these larvæ, though in 1842 Kölliker gave a clue to their function in his paper on the embryology of *D. crassipes*, Fab., stating that on the third caudal segment are two cylindrical tubes connecting with the main tracheal trunks ("— atque ex tertio dorso tubuli duo cylindrici cum trachearum truncis communicantes enati sunt" — Kolliker, Observationes de Prima Insectorum Genesi, etc., Turici, 1842). Perris, in his excellent article on the larva and life-history of *D. sagittariæ*, Fab. (Ann. Soc. Ent. Fr. 2d ser. t. VI., 1848, p. 33, Pl. II., No. 2, fig. 1-2), stated that their function is wholly unknown. Heeger thought they enabled the larvæ to cling to the roots of the plants, and aided them in creeping.

The manner in which these larvæ are enabled to breathe under water and to form a cocoon filled with air has also been somewhat of a problem. At the base of each appendage is what to all appearances is a very large spiracle. Perris thought that these are closed by a thin membrane, but that the air of the tracheal system is purified through

them by osmosis, a highly improbable conjecture, considering the small surface they allow for such diffusion. Von Seibold (Amtlichen Bericht der 34sten Versalung der deutschen Naturforschen und Aerste, Karlsruhe, 1859, Seite 211), in describing *D. linearis*, thinks these to be true stigmata and that the larvæ breathe the air found in the intercellular spaces of the roots, first eating into the root and then inserting the sickle-shaped appendages so that the stigmata are placed close to the openings thus made.

The most careful study of this matter has been made by Dr. E. Schmidt-Schwedt (Bul. Ent. Zeit., Bd. XXXI., Heft II., p. 325, Pl. V., figs. 1–11, 1887) upon *Donacia crassipes*, Fab. The cocoons were found in October on the roots of the white water lily (*Nymphea alba*), and were usually found to contain beetles. How these were filled and kept replenished with air was a problem which had never been satisfactorily explained. He soon found an opening toward the end of the cocoon on the side next the root leading into a passage communicating with the air passage in the root, which explained how the cocoon might readily become filled with air coming out from the root and expelling the water. Though not entirely clear, I should judge from the figures and text that he believed this air passage to be a cavity eaten out by the larva. Later, however, he describes and figures the cavities made through the cocoon and into the root tissues by the two appendages. In the cocoons of *D. piscatrix* and *Hæmonia nigricornis* it is clear that the cocoon is entire next to the root, with the exception of a pair of elliptical holes at one end, leading to two corresponding cavities in the roots and very evidently formed by these appendages. I could find no marks of feeding beneath the other ends of the cocoons, and at least the air is replenished if it is not originally taken into the cocoon through these two passages. Dr. Schmidt-Schwedt points out that usually when a plant is thus wounded a corky formation ensues, but that such is not the case in this until the beetle has emerged from the cocoon and the water is admitted, when a cork formation at once takes place and the passage is closed. It seems evident that the larva, breathing as will be further described, merely forms the cocoon close to its body, thus expelling all the air, withdraws the appendages from the two passages and transforms to the pupa, which thus admits the air from the roots and remains open, replenishing the air for the pupa and beetle.

Concerning the structure and function of these larval appendages, he

states that in cross section each is seen to be composed of five canals, two pairs above and a single larger passage below, which opens below slightly before the tip. By inserting the appendages into the roots the larvæ are enabled to draw in the air found in the large vascular bundles, through this opening in this lower channel, which supposedly connects with the tracheal system. Concerning the two upper pairs of canals he says nothing except that they are highly chitinized to secure the firmness of the appendage, but concerning the lower, remarks : " How this formation —a chitinous tube opening at the end—came to pass histologically I was not able to ascertain till the present observations. It comes near calling to mind a tubular outgrowth of the hypodermis at the stigma. In accordance with this is the fact that the wall of this questionable canal, especially near to the base of the appendage, is not simple, but is double, and no cells are to be found between." (Free translation.) In support of this view he found that small pairs of scars which when cross-sectioned exactly correspond in size to the tips of the appendages, and are at the correct distance from the scars where the larva had been feeding, could be readily found, and these I have found on stems bearing the cocoons of *D. piscatrix*. Doctor Schmidt-Schwedt states, however, that in removing the roots of the food plant from the mud the larvæ always released their hold, and that when rearing them he did not find them with the appendages inserted until he darkened the breeding cage, and then that the *points* were found inserted, but that they were disturbed by the light and withdrew them in a short time. Perris states that he cut off these appendages at the base without injuring the larva. But as Dr. Schmidt-Schwedt says, he did not state how long they would live under water with them removed. On the other hand, neither does the latter writer state that he determined whether or no the larva would not live under water if entirely removed from the root.

I have not been able to study any live larvæ to determine the function and manner of use of these interesting appendages, though I hope to do so at an early date, but have made a very careful study of their structure, only, however, by means of free-hand sections. First, however, it may be noted that true spiracles occur on the cephalo-lateral angle of the mesa-thorax and upon the first seven abdominal segments, as in other Chrysomelid larvæ. The structure of the spiracles, however, is rather different from any others I have observed. I have not made any sections of them, but a lateral view is figured, showing them to be elongate and

apparently with a good-sized cavity within. Spiracles of other Chrysomelid larvæ have merely two lips or flaps, guarded inside by a few hairs. At the base of each of the sickle-like appendages occurs the eighth abdominal spiracle, which I believe to be open. The opening can be seen very clearly in one mount, though it occurs considerably below the surface of the body, and would probably not be seen except in a prepared specimen. A trachea branching from the main trunk can easily be seen opening at each of these spiracles. Around each of these and forming the base of the appendage is a circular, chitinous structure, apparently tubular. From this arises the appendage with no visible line of demarcation.

In cross section each appendage is seen to consist of five passageways. The lower side of the appendage is membranous and encloses the lower channel which extends up through the central portion, between the two main canals. This membrane is clearly an outgrowth of the outer cuticle, connecting the chitinous wall of the two lateral channels, and doubtless covering the whole appendage, though not discernible in a rough, thick section. The two lateral passages have thick, chitinous walls, marked with striations, seemingly tracheal tæindia. The two upper passages are open above, but can be readily closed by a wedge-shaped piece which runs along the top of the appendage. The lower canal has absolutely no connection with the tracheal system, as far as I can observe, and the membrane enclosing it below is continuous with that of the cuticle of the eighth segment. The lateral passages open into the tube surrounding the spiracle. At their base this is at first striated as are the passages, but the striations become irregular, forming a network, and finally a sieve-like or grate-like structure on the anterior portion. When the appendage is viewed laterally it is transparent enough to reveal a series of elliptical openings running along the upper portion, two series evidently arising from each of the lateral passages. From each of these openings arise several small tubes, sometimes branching slightly near the base, each of these structures resembling a rather coarse miniature gill. By breaking open a lateral passage from below one or two of these holes can be clearly seen. The outer series of holes and the tubules branching from each are easily seen both by a lateral view and cross section. The exact structure and position of the inner series I have not been able to determine so satisfactorily, but they seem to extend along the membrane forming the side of the wedge-shaped apex of the append-

age, the series from each lateral passage along either side, and each sending off a small branch toward the other, somewhat before reaching the lateral margin, where they terminate. Whether these tubules are open at the tips or not I have not been able to determine. If so, they doubtless act as a sieve through which the air is admitted to the lateral passages which convey it to the main tracheal trunks. But if we consider them as closed, as I am inclined, the whole structure is remarkably well adapted to aerating the tracheæ by osmosis, whether the pure air is secured from the air cells of the plants or from the water. The wedge-shaped apex of each appendage shuts down tightly on either side, thus making a solid cylinder with which to pierce the plant. That it does so pierce the tissue of the root while constructing the cocoon, and that the passage thus made replenishes the air of the cocoon, there can be no doubt. But whether the larva secures air from the intercellular spaces of the root by direct communication or osmosis, or by osmosis from the water, the appendages thus serving as tracheal gills, would seem to need demonstration, inasmuch as Dr. Schmidt-Schwedt observed only the points of these appendages inserted into the roots.

However that may be, I feel certain that the appendages are truly a highly specialized form of spiracle. I would hardly arrive at this conclusion had I not observed a very similar structure in the pupæ of the genera *Octotoma* and *Odontota* of the tribe *Hispini*. The larvæ of these species mine within leaves, and the pupæ remain within the leaves. Projecting caudad from either fifth abdominal spiracle—which is usually the last in Chrysomelid pupæ—is found a stout, chitinous spine about the length of a body segment. In the pupa of *Octotoma plicatula* the fourth spiracle is expanded caudally about half as much as the fifth, and the third is but slightly expanded, merely being produced to a point caudally. But the gradation is complete, and it is easily seen that the spine-like process of the fifth segment is but an outgrowth of the spiracle. Each of these spiracles, 3 to 5, has the external opening surrounded by a circular tube, also connecting with the trachea, and this circular tube is merely drawn out to a point, so to speak, to form the process of the fifth segment, the process gradually increasing in length and acuteness from the second to the fifth abdominal spiracle. This appendage forms merely a simple tube with the sides curled up and in to form an elongate cavity, in which the lining surface is membranous and finely reticulated. Further than this I was unable to observe any structure, as the projections are

hardly .12 mm. in length. The resemblance to the structure of the eighth abdominal spiracles of *Donacia* is, however, most striking, and, with the exception of the inner structure of the appendages, is complete. This difference, I think, can readily be accounted for and the evolution of a type of spiracle like that of *Donacia* larvæ be shown from a simpler form as found in these *Hispid* pupæ.

The life-history of *D. crassipes* has already been intimated. I do not know that the life-history of *D. piscatrix* has been carefully studied, but from facts obtainable I would judge it to be as follows: The eggs, which are of a brown colour, flattened oval in shape, about .75 by .25 mm., are laid in a double row, the line between the two rows being formed by the ends of the eggs, 20 to 30 of which are laid in a bunch. These are deposited early in summer on the roots of *Nymphæas*, upon which the larvæ feed. The cocoons are found on the roots or sometimes on the stems of water plants, and the beetles emerge either in the early fall or remain in the cocoons till the next spring.

The larvæ of *Hæmonia* are much the same, the specimens I have seen being shorter, and plumper, with the abdominal appendages extending ventrad almost perpendicularly and covering the caudal segments. The best characteristic between the two genera is the loss of the ocelli in *Hæmonia*, which I judge is the more specialized genus. I have been unable to observe the prothoracic spiracle mentioned by Lacordaire.

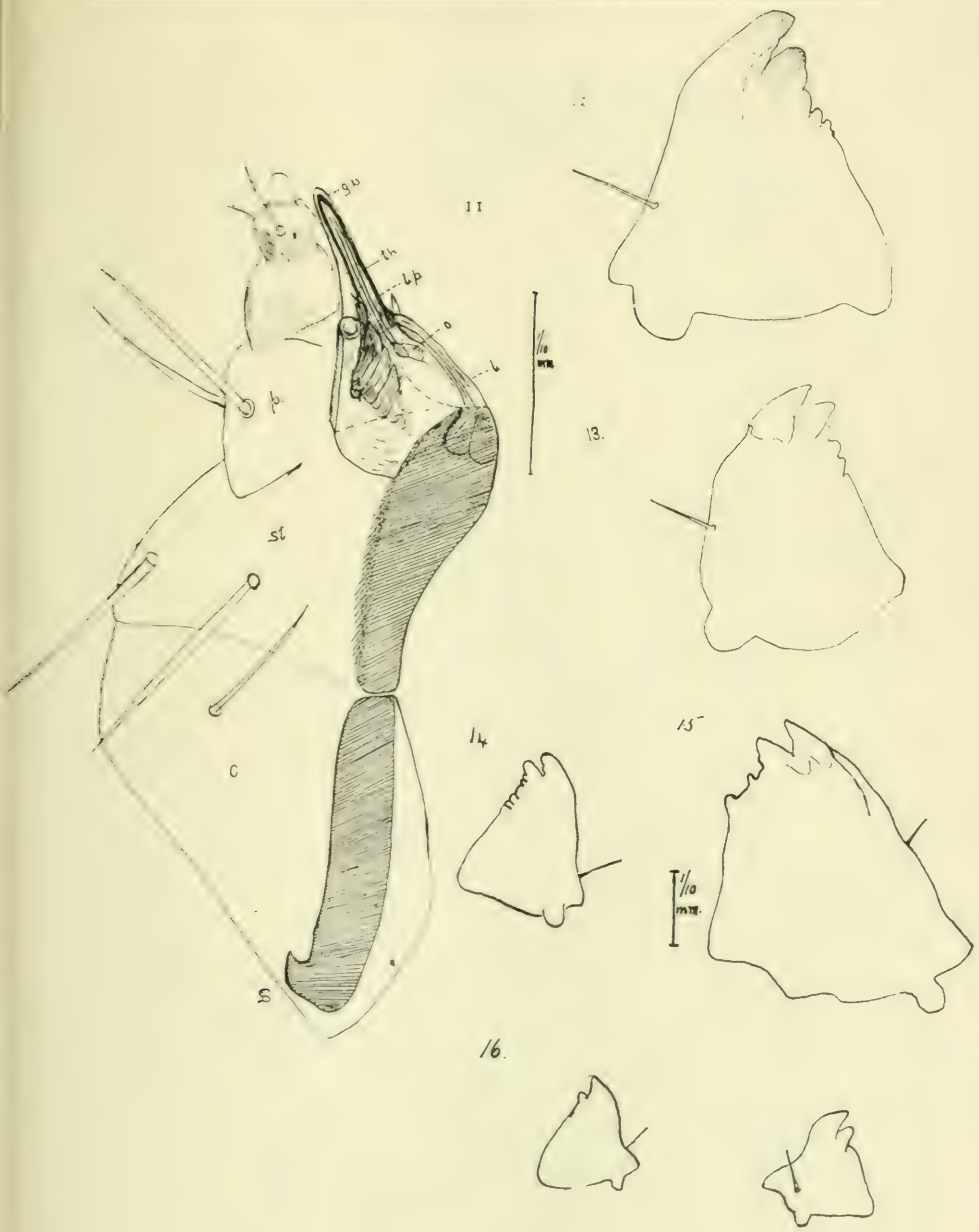
Certainly, altogether, the larvæ of this tribe are most distinct from those of all other Chrysomelidæ, possibly even more so than are the adult beetles.

EXPLANATION OF FIGURES.

Figures are from camera-lucida drawings by the author, except Figs. 17-20.

Fig. 1.—Antenna, *Donacia piscatrix.*
" 2.— " *Donacia crassipes.*
" 3.— " *Haemonia zosteræ.*
" 4.— " *Crioceris merdigera.*
" 5.— " *Chrysomela varians.*
" 6.— " *Haemonia nigricornis.*
" 7.—Labrum, *Donacia crassipes.*
" 8.— " *Donacia piscatrix.*
" 9.— " *Haemonia nigricornis.*
" 10.— " *Haemonia zosteræ.*

1
2.
3.
4
5
6
7
P. crassipes
8
Dpiscatrix
1/6 mm.
9
10


11
12.
13.
14
15
16.
1/10 mm.
1/10 mm.

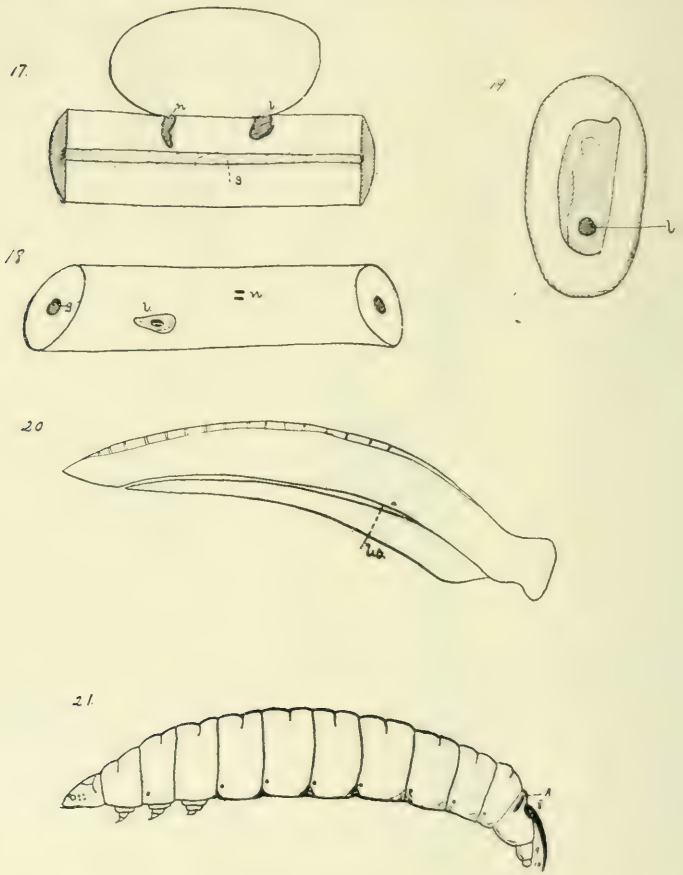


Fig. 11.—Maxilla, *Donacia piscatrix* and *crassipes*.
c., cardo ; st., stipes ; p., palpus ; G., galea ; l., lacinia ; l. p., process of lacinia ; g. p., process of galea—or sheath ; th., threads in lacinial process ; o., ovoid mass.

" 12.—Mandible, *Haemonia nigricornis*.

" 13.— " *Haemonia zosteræ*.

" 14.— " *Donacia crassipes*.

" 15.— " *Crioceris merdigera*.

" 16.— " *Donacia piscatrix*.

" 17–20.—(after Schmidt-Schwedt).

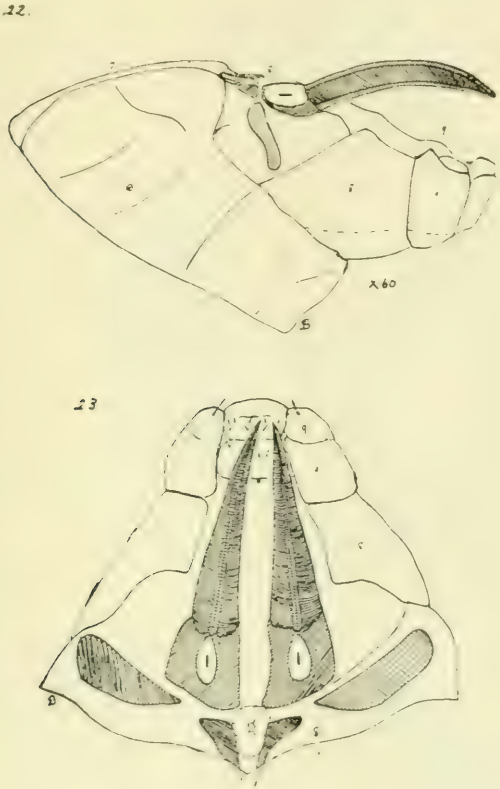


Fig. 17.—Longisection of stem and cocoon of *D. crassipes*.
n., cavity made by abdominal appendages; l., feeding cavity.

" 18.—Exterior view of root, showing feeding spot (l) and scars of abdominal appendages (n).

" 19.—Under side of cocoon when removed from stem; l., opening ("Oeffuung in demselben").

" 20.—Lateral aspect of an abdominal appendage; l.c., lower canal ("der untere unpaare kanal").

" 21.—Sketch of larva of *Donacia crassipes*, enlarged; a., anus.

" 22.—Lateral aspect caudal segments of larva of *D. crassipes*.

" 23.—Dorsal aspect of same.

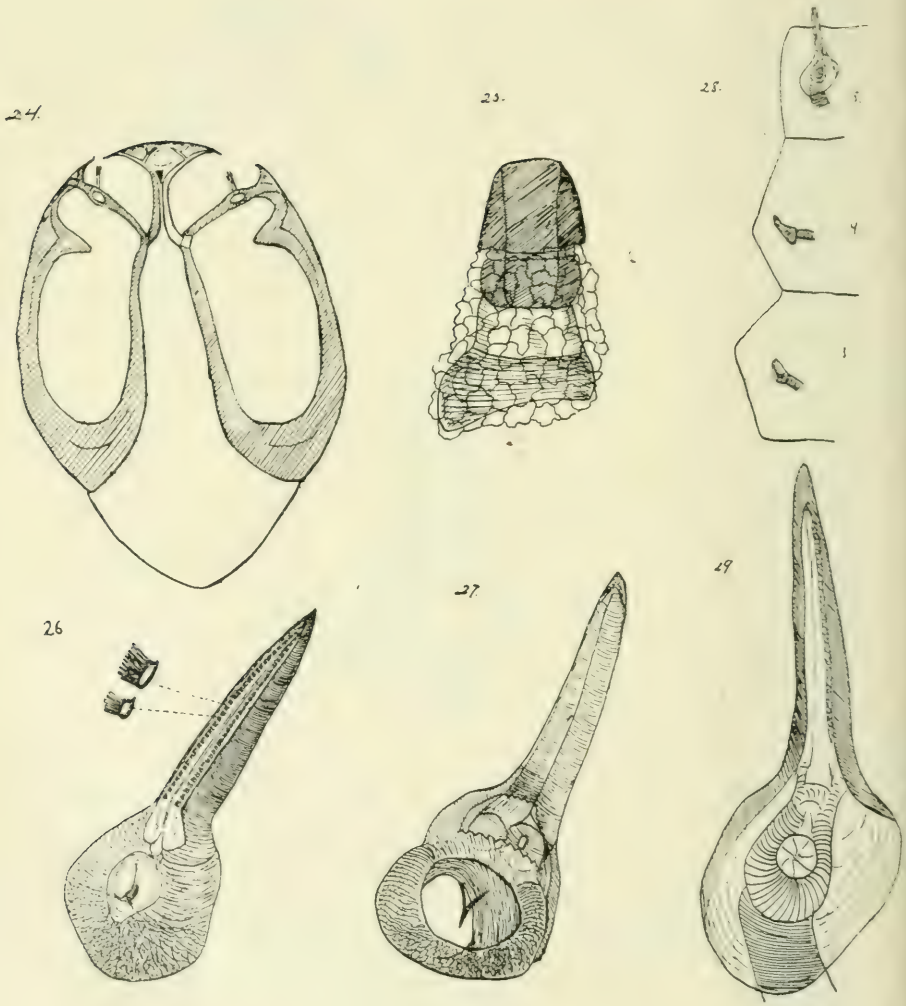

24.
25.
28.
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Fig. 24.—Transection of appendage of eighth abdominal spiracle.
" 25.—Lateral view of abdominal spiracle (1–7) covered with epithelial cells.
" 26.—Dorsal aspect eighth abdominal spiracle.
" 27.—Ventral " " " "
" 28.—Third, fourth and fifth abdominal spiracles of pupa of *Octotoma plicatula*.
" 29.—Fifth abdominal spiracle of same.

A PARASITE THE SUPPOSED CAUSE OF SOME CASES OF EPILEPSY.

BY G. H. FRENCH, CARBONDALE, ILLINOIS.

Gastrophilus epilepsalis, n. sp.

Larva: Length, 1-12 inch; of the shape shown in the accompanying figure (Fig. 30), with twelve joints besides the head, or thirteen joints; head rounded, with two brown-black hooks, the side view of the cut showing only one of them; head a little longer than broad, rounded; the first incisure with a patch of bristles below the hooks, but not anywhere else; incisures 2 and 3 without bristles; incisures 4 to 12 armed with several rows of minute bristles, all very short except those on 12, pointing backward; joint 13 rounded. Extending back from the hooks and of the same colour, only in places paler, is a marking that seems to be a chitinoid support for the hooks, beneath the cuticle. Colour a dirty yellowish white.

Usually it is not wise to describe a species as new from a larva, but for the following reasons it seems best in this case. Last November, at the meeting of the Southern Illinois Medical Association, in Chester, Ill., Doctor H. C. Adderly, of that town, reported to the Association a case under his charge of a boy, then 12 years old, who had been subject to epileptic spasms for four years, often having as many as twenty spasms in twenty-four hours. Upon producing a free catharthesis (the general condition of the bowels being constipated), he noticed that the excreta was "literally alive" with

an entozoan. Some of these were sent to St. Louis for identification, but were reported as unknown to them.

With the report Dr. Adderly exhibited a few of the entozoa in a small vial of formaline. These were later brought to me by Dr. A. M. Lee, President of the Association. They were new to me. From correspondence with Dr. C. W. Stiles, of the Bureau of Animal Industry, Washington, D. C., and others, I have decided that the entozoan is new and therefore propose for it the above name. Doctors Howard and Coquillett pronounce it without hesitation the larva of a species of *Gastrophilus*, though in some points it seems to me to resemble some species of the allied genus *Dermatobia*.

For several reasons this entozoan found in the enteric canal of this boy seemed to be the cause of the epilepsy. 1st. After a free catharthesis the spasms would cease for from three to six weeks, or till a new brood were grown. 2nd. The boy had with the spasms globus hystericus, which is reflex from the pelvic organs. 3rd. That the spasms were those of genuine epilepsy there was no doubt, as there were all the usual symptoms, including mental aberration. 4th. Two other cases of epilepsy are known to the writer where these parasites have been found, one in Chicago and the other in Sparta, Ill. 5th. Upon Dr. Adderly's changing his treatment from that usually followed in epilepsy to anthelmintics, the boy recovered, having had only one spasm since beginning that line of treatment. Under date of May 19th he writes me: "My little patient seems to be in excellent health, and I hope it will be permanent."

As to the adult state of this larva I can say nothing now, nor how it gains entrance to the human system. I had hoped to get more material before writing this, from which I might answer both of these questions, but as yet have not succeeded. But the continuous infestation of the enteric canal by dipterous larvæ is not new. Dr. J. Gasser, of the military hospital of Oran, Algeria, reports a case of ten years' standing. The date of this report was 1895.

An interesting exhibit prepared for the Paris Exposition is a complete set of bed hangings manufactured in Madagascar from silk procured from the halabe, an enormous spider found in certain districts of the island. Aside from being so unusual, this exhibit seems to indicate that there is a future for silk manufactured from spider's web. The matter has received the attention of M. Nogue, the head of the Antananarivo Technical School, who has already achieved wonderful results. Each spider yields from three to four hundred yards of silk, which can be taken from the animal every ten days, it being set free in the interval. The silk of these spiders is stated to be finer than that of the silkworm and of an extraordinary golden colour. It is extremely tenacious, and can be woven without the slightest difficulty.—*N. Y. Post.*

HARPALUS CALIGINOSUS AS A STRAWBERRY PEST, WITH NOTES ON OTHER PHYTOPHAGUS CARABIDÆ.

BY F. M. WEBSTER, WOOSTER, OHIO.

In nearly all of our books relating to beneficial insects, published within the last twenty years, there is almost sure to be found, somewhere, the figure of a larva tragically devouring a smaller larva, the larger having been originally figured as that of *Harpalus caliginosus*. Although attention has for some time been called to the fact that the larva thus figured really belongs to another species, the true *H. caliginosus* being as yet unknown, yet the use of the figure in its old application still goes on. The carnivorous habits of the beetle itself, however, have been pointed out by Dr. Lintner, in his Twelfth Report, p. 209, where it is recorded as feeding on the army worm, and in Insect Life, p. 228, Vol. VII., as feeding upon grasshoppers. The writer has also observed it preying upon other insects. For this reason, notwithstanding its known fondness for seeds and grain, it has been looked upon, generally, as a beneficial species, its known vegetable food consisting either of seeds of no economic value, or the amount of grain being too small to be taken into consideration.

On June 12, 1898, I received from Mr. J. A. Fisher, Flushing, Ohio, complaints of a very serious injury to ripening strawberries, and Mr. C. W. Mally, then my assistant, was sent out to investigate the cause of the trouble. Other strawberry growers, in the neighborhood of Flushing, were found to be also suffering from the same depredation, but, though Mr. Mally worked faithfully, he was not able to solve the problem of the author of the ravages, which, in some cases, resulted in a loss of the larger portion of the crop. Considerable numbers of a Lygæid, *Myodocha serripes*, were found about the berry fields, some of them in the act of puncturing the fruit, and, I might add here, that in nearly every case where complaints of this injury have been reported to me, this last insect has been sent as the culprit. On 25th of the same month, Mr. Oliver Garlough, Clifton, Ohio, in almost the opposite corner of the State, reported the same trouble, except perhaps more emphasized, also accusing the *Myodocha* as the cause thereof.

My assistant had noticed in his investigations at Flushing, that wherever the strawberries had been attacked there would be found, on the ground or on prostrate leaves directly underneath, scattered fragments

of the hulls of the seeds of the strawberry (see plate 6), thus showing that the pest must have possessed a biting mouth and a fondness for seeds, and while this placed the Lygæid beyond the boundaries of consideration, nothing else was found to point to any other insect, although some observations made more than twenty years before led me to suspect some Carabid as the true author of the trouble. The fruit itself was comparatively little eaten, the surface, especially in case of that nearly or quite ripe, being badly torn and lacerated; not much gouged out, as would likely follow the attacks of a fruit-eating insect or myriapod. Despite the fact that very few Carabids had been found about the affected strawberries, I strongly suspected that, sooner or later, we should find one or more of these doing the injury.

On June 6, 1899, there came complaints of the same sort of injury from Mr. William Hoyle, Radnor, Ohio, a new locality, Mr. H. being very confident that the Lygæid caused the trouble, as he had found many of these on the berries. More urgent matters claimed my attention, and no investigation of this outbreak was attempted, and no other attacks were reported to me during the year.

June 6, 1900, I received a note from Mr. Fisher to the effect that the same trouble that had occurred in 1898 had again commenced, and a few days later a telegram reported continued serious effects. On June 12 I visited the locality, personally, and found fully half of the fruit being rendered worthless, the injury being done during the time between evening and late morning, say between 8 p. m. and 7.30 a. m. The injured fruit had been but little eaten, but nearly every seed was missing and the hulls scattered underneath. I have noticed this, rarely, for years, but as it never appeared to amount to more than a trivial injury, I had done no more than to wonder at the nature of the author thereof. The *Myodocha* were present, but it was clear that the work was not of their doing. Searching about a cluster of badly-injured berries, one *Harpalus caliginosus* was found underneath a clod, but, as the berries had evidently been attacked several hours before, this proved nothing. Further examinations resulted very much the same, until I found a cluster of ripe berries, the surface of which were raw and bleeding from a seemingly fresh attack, and, as usual, one of the *Harpalus caliginosus* was found hiding in a small crevice in the ground near by. After two or three such had been captured, a microscopic examination of the contents of the alimentary canal revealed the broken and crushed fragments

HARPALUS CALIGINOSUS AS A STRAWBERRY PEST. (PLATE 6.)

of the substance of the seeds in great abundance. Material collected in early morning and examined microscopically, showed the alimentary canals literally packed with this sort of food. I did not take the beetles in the act of working their destruction, as they are exceedingly shy, but some days after my return, a letter was received from Mr. J. Marion Shull, North Hampton, Ohio, enclosing with a cluster of injured strawberries a specimen of the pest, and stating that he had observed them in the very act. This was my first letter from Mr. Shull, and he could have known nothing of my investigations, and I am indebted to him for the drawings from which the accompanying illustrations were engraved.

The damage has, the present year, proved very severe, several strawberry growers reporting that half their crop had been ruined. Mr. Shull states that nine-tenths of their crop was destroyed within 48 hours, while Mr. A. H. Miller, of Osborne, stated that of his Crescents not five per cent. were picked, and of ten other varieties none were picked at all. This was the first year that Mr. Miller had been troubled by the pest, though he is perfectly familiar with the insect itself. Of the different varieties attacked, the Cumberland, Haverland and Greenville are said to suffer the worst, though this may not result from any selection of varieties by the beetles, but may be owing to better opportunities for hiding away during the day. Prof. M. V. Slingerland wrote me early in July of this year, stating that he had received complaints of similar injuries to the strawberry in New York. The beetles have been excessively abundant in the city of Wooster, literally swarming during some evenings and driving people from their front porches and verandas, forcing them to sit indoors during the early evenings, especially in the near vicinity of the electric lights. Although there are many acres of strawberries grown in the near vicinity of the city, strangely enough, I have been unable to learn of any injury from the attacks of these beetles, and have wondered if it were possible that the electric lights had attracted them from the surrounding fields to the city.

Both Dr. Bos and Miss Ormerod state that *Harpalus ruficornis* eats the fruit as well as the seeds of strawberries, but I think that further investigation of the European species will disclose the fact that, like its American relative, it is the seeds that are its favourite food, and though, as stated by Miss Ormerod, it will live in confinement on strawberries, yet when free in the fields it will prefer the seeds, as in her Twenty-first Report, p. 115, she quotes one of her correspondents as stating that the

ground in many places where the beetles had been at work was covered with a powdery dust—the seeds eaten off the berries. The seeds of the strawberry are not very easily detached from a ripe fruit without taking more or less of the substance along with it, and in the case of our *Harpalus caliginosus*, there were sometimes small pits eaten out of the berry. I attributed these to the work of other insects. Miss Ormerod calls attention to the increasing seriousness of this injury in England, in her Reports for the years 1894, 1895, 1897, and 1899; in one instance, at Bone Hill, near St. Alban's, the beetles were so numerous about 10 p.m., June 14, 1897, that members of a family sitting in front of the house supposed that the insects were dropping from the roof. From a comparison of the figure of an injured strawberry, which is used in illustration by Miss Ormerod, in her reports of the ravages of *Harpalus ruficornis*, with the figure drawn by Mr. Shull, from life, it will be seen that the work of the two species is very much alike.

As our species is very large and conspicuous, they are easily seen after one has learned where to search for them, and when their work is first observed they can be hunted out and killed, or perhaps they might be poisoned with a mixture of wheat bran, sweetened water and arsenic, placed under boards laid down between the rows of plants.

The Carabidæ, to which family of insects *Harpalus caliginosus* belongs, are generally considered beneficial, as they are supposed to feed, largely at least, upon other insects injurious to the fruit and grains of the husbandman. The number of exceptions to this rule, however, appears to increase as we come to gain a more exact knowledge of the actual food habits of the species of the family, though it must be remembered that these outcroppings of a phytophagous food habit are usually only occasional, and perhaps in some cases confined to certain seasons of the year, when, like the robin, they collect a tax from the husbandman for the good that they have done him during other portions of the year.

In Europe, *Zabrus gibbus* and some species of *Amara* have been long known as occasionally destructive, and, in 1892, Dr. J. Ritzema Bos reported *Harpalus ruficornis* as destroying ripe strawberries in Goes, Zeeland, Holland. (Biolo. Centralb. XIII., p. 255.) As stated in the foregoing, Miss Ormerod, in her Reports for 1894, 1895, 1897-8-9, has called attention to similar and increasing depredations of the same species on the strawberry in England. The latter author also finds *Calathus*

latus, *C. cisteloides*, *Pterostichus madidus* and *P. vulgaris* occasionally injurious to cultivated crops.

In our own country, *Omophron labiatum* has long been known as injuring young corn in the Southern States. Mr. Townend Glover, the first United States Entomologist, as early as 1863, stated that he had observed *Harpalus caliginosus*, in two instances mounted high on grass, apparently feeding on the seeds. (Rep. Comm. Agr., 1863, pp. 565-6.) For several years prior to 1879 the writer had observed both this species and *Harpalus pennsylvanicus* feeding upon the seeds of the common ragweed, *Ambrosia artemisiæfolia*, and the latter species was also observed feeding on a kernel of wheat, seeds of timothy and seeds of panic grass, *Panicum crus-galli*, tearing the latter out from the heads. (Prairie Farmer, Nov. 15, 1879.) In a later issue of the same publication, I also gave an account of the seed-eating habit of *Anisodactylus sericeus*, which squeezes out the immature seeds of *Poa pratensis* and devours them. In 1880 the writer also recorded the fact of *Harpalus herbivagus* feeding on the young shoots of *Poa pratensis* in early spring. (Am. Ent. N.S., Vol. 1, p. 173.) During the same year, and in the same publication (p. 251), Prof. William Trelease also recorded the fact of *Harpalus caliginosus* feeding on the seed of *Ambrosia artemisiæfolia*, while on p. 277 of the same publication, Mr. Wm. A. Buckhout stated that he had observed the insect, in 1876, feeding on what he at the time supposed to be the pollen of the staminate flowers as well as upon the seeds. Recently, Dr. Howard wrote me that Mr. F. H. Chittenden had observed hundreds of these beetles at the same time feeding upon the seeds of this same species of plant. Nearly or quite all of these observations on the *Harpalus caliginosus* feeding on Ambrosia seeds were made in September, at a time when the newly-developed adults are probably near the beginning of their career, as we usually find them hibernating in cells in the ground at the depth of several inches, and hence this is only a clue to their food habits during a particular period, and while they may and do feed largely upon the seeds of this weed at that time, they can hardly be said to favour phytophagous food at other times of the year.

In 1882, microscopic examinations of the alimentary canal in a large number of Carabidæ, carried on by Prof. S. A. Forbes, the material for which had been collected by the writer, in most instances the beetles having been captured under circumstances that would lead to a suspicion of vegetable feeding, revealed the fact that a considerable percentage of

the food found in the alimentary canals of 82 individuals, belonging to 18 genera and 32 species, was of a vegetable character. Collections not made by the writer, and coming from an orchard seriously affected by cankerworm, 71 specimens, and 10 from a field infested by chinch bug, and others from a cabbage patch that had been attacked by cutworms, indicated, in most cases, the partiality of the Carabidæ for animal food, where this was abundant and easily obtainable (12th Report State Entomologist of Illinois, pp. 105-116).

In 1885, *Agonoderus pallipes* was reported to the U. S. Department of Agriculture, from Illinois and Iowa, as damaging young corn by gnawing the seed kernels and eating the sprouting roots (Bull. 12, O. S., U. S. Dep. Agr., Div. Ent., pp. 45-6, 1886), similar reports of injury coming also to the writer from farmers in Indiana during the same year. Since that time it has also been reported to me as working a like injury in Ohio.

In 1886, Dr. J. A. Lintner reported injury to the foliage of the strawberry by *Bembidium quadrimaculatum*, in Connecticut (3rd Report State Ent., N. Y., p. 98).

From all of this it would appear that many of our Carabidæ are naturally, and by preference, of carnivorous habits, but during a scarcity of this kind of food, can subsist upon that of vegetable character.

PARTIAL LIFE-HISTORY OF DICHOGAMA REDTENBACHERI, LED.

BY HARRISON G. DYAR, WASHINGTON, D. C.

The Pyralid genus Dichogama has not yet been reported from United States territory on the mainland, but at least three species occur in southern Florida. The following notes were made on the larva of one of them, *D. Redtenbacheri*.

Stage II. (?)—Head flat before, clypeus high, mouth pointed; luteous, ocelli black; width .4 mm. Body a little flattened, translucent, yellowish, a geminate lateral brown stripe. Cervical shield large, colourless, brown dotted on the tubercles and on lateral edge: anal plate small, not marked. Tubercles small, brown; setæ long, stiff, pale. Skin sparsely granular; segments scarcely annulate.

Stage III.—Head whitish with streaks of brown dots on the lobes converging to clypeus, mouth brown; width .7 mm. Body flattened, green from the food: a double broken lateral black band reaching from the spotted cervical shield to the colourless, spreading anal feet. Feet all pale.

Stage IV.—Head whitish, heavily black spotted except over the

clypeus; width 1.1 mm. Cervical shield transparent, black dotted at tubercles and edge. Body flat, green dorsally from the food; a white broken subdorsal line on joints 3 to 13, and double black lateral one crossing tubercles ii. and iii. Feet colourless; setæ long, white.

Stage V.—Head dark, the spottings obscured; width 1.7 mm. Body purplish dorsally (in this specimen), with distinct yellow subdorsal line on joints 3 to 13, double lateral black line and broken, pale yellow, stigmatal one. Subventral region whitish. Setæ long whitish; tubercles, except iii., minute.

Stage VI.—Apparently interpolated; width of head 2.2 to 2.5 mm. As in the next stage.

Stage VII.—Head round, the apex below prothorax, clypeus high, reaching the cervical shield in the ordinary position of retraction; antennæ as long as mandibles; whitish, with remote scattered dashes or patches of dark brown, principally in a double line on each side of the vertical notch and also in a parallel row across the centre of the lobe obliquely; width 2.7 to 3.0 mm. Cervical shield large, membranous and transparent, so that the retracted head is plainly visible through it. Anal plate concolorous with the body. Body a little flattened, segmental incisures marked; segments 3-annulate, the anterior annulet small and not reaching the dorsum. Skin translucent, not strongly marked. Greenish, a broken, yellowish white, subdorsal line above tubercle i.; a similar stigmatal line; slight whitish streaks in the lateral space; a double waved and broken lateral brown line covering tubercle iii., which is much larger than the others and conspicuous. This line varies in distinctness, sometimes being obsolete, represented only by the large dark tubercle. Slight whitish markings subventrally. Tracheal line white, its ramifications visible by transparency. Cervical shield slightly brown dotted. Feet colourless, normal. Tubercles normal; on abdomen, i. dorsad to ii., all small except iii., iv. + v., vi. single, vii. of three setæ; on thorax ia + ib, iia + iib and very large, iv. + v. Tubercles sometimes surrounded by blackish. The subdorsal and stigmatal pale lines extend over joints 3 to 12. At the end of the stage the larva turns red and seeks a place for spinning. The cocoon is composed of leaves fastened together and bitten in an ellipse, the inside lined with silk.

Food-plant.— The larvæ live among the leaves of *Capparis cynophallophora*, fastening them together with silk and hiding among the skeletonized remains, or in an abode of fresh leaves united with silk.

DESCRIPTION OF THE FULL-GROWN LARVA OF GRAPTA J-ALBUM.

BY DR. JAMES FLETCHER, OTTAWA.

On the 14th June, at one of the excursions of the Ottawa Field Naturalists' Club to Cumberland, Ont., I was fortunate enough to find beneath an elm tree (*Ulmus americana*), a full-grown larva of *Grapta J-Album*, of which the following is a description :

Length, one and one-half inches. Shape slightly fusiform, gradually tapering to the end from fourth segment. General colour, a delicate glaucous green, or white washed with green with black spines, which from the size of the body appear to be rather sparsely distributed. The three dorsal series of spines black, springing from a bright yellow field, which is three times the diameter of the base of the spine. The head large, very bristly and tuberculate. Head black at the sides and white in front ; face white, cheeks and sides of head black, including the ocellar field and two large apical compound spines ; the cheeks black, covered thickly with large white elongated and slightly curved cone-shaped (or sugar-loaf shaped) setiferous tubercles, which are almost long enough to be called short thick bristles, each one bearing at its apex a slender bristle. These bristles are black or darkened on the tubercles of the upper and lower parts of the head. Ocellar field black and distinctly margined against the white face ; mandibles black, frontal triangle white clearly outlined with black ; head bearing on each side of apex a large stout, conspicuous, jet black branched spine, with about five smaller sized spinelets, all of which bear black bristles at apex. Behind the cheeks and running down from the apex, being in fact a continuation of the white face, is a white band, which gives the appearance of the head being white, with a large black area on each side, which includes the apical compound bristles and the mouth-parts.

Down the dorsal area are three series of black branched spines, with 5 to 7 branches—a medio-dorsal series, a lateral series, and a supra-stigmatal series—all black and bearing from five to seven spinelets. The spines of the lateral series half as long again as those of the three other series of bristles. Spiracles black, and beneath these is a sub-stigmatal series of branched spines similar to those above the spiracles, but white ; the bristles only at the tips of the branches being slightly infuscated. The position of the branched spines of the larva is as follows : The

medio-dorsal series is one-third from the front margin of the segment. The lateral series and the infra-stigmatal series slightly posterior to the spiracle and in the same line. The supra-stigmatal series slightly anterior to the spiracle and in almost the same line as the medio-dorsal series.

Prolegs and thoracic feet white, slightly darkened towards the claws, and all pretty thickly covered with white deflexed bristles. On segment No. 2, instead of the large branched bristles which occur on the rest of the body, are simple short thick bristles exactly similar to those on the face, and each bearing at its apex a slender black bristle. The skin is white and semi-translucent, allowing the green contents of the body to show through. This together with the shape of the larva gives the caterpillar a considerable resemblance to an *Apatura* larva. The intersegmental folds are white and the M-shaped dorsal markings of *Grapta* larvæ are white and indistinct. The pale delicate green colouring of this larva gives it a very un-Grapta-like appearance.

PUPATION.

On Sunday evening, June 16th, the larva was found to be suspended for pupation. At 7.15 p.m. gentle undulations of the abdomen (peristaltic motions), accompanied by straightening out and slowly drawing up of the body, were noticed, and the contents of the body seemed to run down to segments one to eight.

7.25—Last segment apparently empty.

7.27—Body drawn up several times and then straightened out, undulations running along the body as if an effort were being made by the insect to shrink away from its skin.

7.35—The bases of some of the thoracic tubercles pale as if air were under them. These were the areas which afterwards in the pupa were gilded. The skin at the base of the prolegs apparently loosening and little folds showing.

7.40—Colour of the body darkening, the peristaltic motions continuing all the time.

7.43—The muscles apparently relaxed and the body hung down almost the full length.

7.45—The body drawn up vigorously 3 or 4 times, the peristaltic motions continued energetically and with some effort.

8.00—Muscles relaxed and the body hanging down loose again without movement for about half a minute.

8.05—Body contracted and drawn up vigorously, and with a wriggling, impatient, twisting movement four or five times repeated.

8.12—The two posterior abdominal and anal prolegs apparently drawn in from the skin.

8.15 to 8.45—The body constantly drawn up vigorously, the undulating movements of the body kept up almost continuously, with three or four short intervals of rest of about a quarter of a minute each, during which the muscles were relaxed and the body hung down almost straight, the head and three thoracic segments only being slightly curved upwards.

8.45—Segments No. 12 and 13 showing minute wrinkles in the skin.

8.46—Body relaxed for a few seconds and then drawn up slowly, but more firmly and to a greater degree than previously: at the same time the body was twisted slightly from left to right, and the skin began to pass up perceptibly over the anal segments, this movement proceeding segment by segment as though the insect were crawling through the skin towards the head.

8.47—The skin burst over the 3rd and 4th segments, and by the undulating movement of the body was gradually drawn back until the chrysalis emerged: the skin on ventral surface adhering longest, and apparently the greater part of the weight of the body was borne and the body of the pupa was held from falling by reason of the moisture of the skin, which made it adhere to the soft pupa. I could detect no effort on the part of the chrysalis to hold on to the skin by grasping it between the folds of the abdomen, although this was probably the case when the cremaster was withdrawn and slid over the edge of the empty skin. This was done in a most definite manner: the empty head-case and part of the skin, being in the way, was pushed on one side, and the cremastral hooks by a vigorous gyrating motion of the body twisted into the silk. When firmly attached the body was twisted vigorously round and round for nearly three minutes, from 8.53 to 8.56, in the effort to get rid of the empty skin, the body being drawn up and curved considerably while this was being done, as if with an effort to pull the empty skin away from the silk by means of the abdominal spines, although of course the whole body at this time was very soft. At 8.56 the empty skin was thrown down, when the pupa at once hung motionless and the characteristic spines and projections expanded and took their permanent form. The mat of silk was large and loose, with several detached strands running to adjoining objects. The silk mat white, with no distinct button as in most of the

other species. Both at the time the larva was found beneath a stone in a wall at Cumberland, Ont., and in the box where the pupa was afterwards formed, there were several loose threads of silk over the body and entangled in the spines.

The chrysalis immediately after formation was of a beautiful semi-translucent emerald green, which later, and by the following morning, changed to a ruddy transparent bronze, washed with olive green. The six gold blotches on dorsum large and conspicuous. General shape of the chrysalis somewhat similar to that of *Grapta Interrogationis*, but more robust; rather larger but almost identical in shape with that of *Vanessa Californica*, particularly with regard to the outline of the thoracic protuberance.

The chrysalis formed on 17th June and the pupal period lasted 11 days. This would seem to indicate that this species, like all the other Canadian Graptas, is double-brooded, but I never remember to have seen the butterfly flying at Ottawa except in spring and autumn.

NEW HISTORIES IN HYDRŒCIA.

BY HENRY BIRD, RYE, N. Y.

(Continued from page 234.)

Hydræcia rutila, Gn.

This was the next discovery of the season, and as work in former years had never unearthed more than one new larval condition per season, it became evident 1899 was being especially fortunate. We may well say unearthed, as it was actually necessary to do considerable digging to get at these fellows, so far down were they in roots below the surface. The preferred food-plant is *Solidago sempervirens*, a plant particularly local to the Atlantic seaboard, and it was naturally supposed we had to deal with an insect thus restricted in its range. Other things conspired to get ideas rather elevated, for it was not known, of course, before the moth appeared what species the larva might prove. There seemed an unusual feature in that among the numerous stems arising from one root cluster, when one was found infested, there would surely be *two* examples—no more, no less—found in the bunch. This happened in every case, and occurs so often as to lose the aspect of being any coincidence. Many times but one larva would be found at first; further searching, however, always disclosed a mate. Burrowing well down

in the roots, they still have quite an extended gallery high up in the stem. The reason for this was one day apparent when a very high tide covered the marshes with several inches of salt water. In no way discomfited, our friends now make use of their upper chamber, which in cases of this kind is their only salvation. *Hydræcia* larvæ when mature drown easily and are not able to withstand immersion in any such manner as do the boring genera *Nonagria* and *Bellura*.

So, taking all things into consideration, it was inferred some species quite out of the ordinary should come of it, and there was almost a disappointment when common everyday *rutila* was the final result. In our particular location, where a blackish stream meanders through the salt meadows, the food-plant grows at the very edges of the bank, and the rather novel mode of getting larvæ without leaving the rowboat was experienced. Here, too, was a good example of their fondness for location, as the old stems of last year containing the empty pupa shells were frequently met, plainly showing a residence of former generations. Plants thus situated were subjected to inundation at every spring tide, not to mention the freshets when the ice breaks up in March. The stems and root stocks are slender for the working of so large a borer, and it is ever a tight squeeze with them. So all waste material must be passed out of the larger ventilating aperture—there are several of these —and this is not made at the ground level, but some distance up in the stem, for reasons very apparent. These larvæ are not given to *Solidago* alone, but have a number of substitutes which do equally as well. Becoming mature about August 15th, they are influenced by the stay-at-home notions which most of the other species possess, so favourable to the collector, and change to pupæ within their burrows. Thirty days is about the average of this period, and the moths when emerged are attracted to light in numbers nearly equal to *nitela*; at least that is the experience at Rye.

It seems to have been an unsettled question as to how, when and where these moths deposited their eggs? From appearing rather late in the season, it was quite naturally supposed by some that the moths might hibernate over the winter and lay eggs the following spring. What little circumstantial evidence that had come to light from former studies did not, however, point in this direction, and particular pains were taken the last season to keep the moths in surroundings as nearly natural as possible so that eggs might be secured. The plan worked well and the

desired results were gained under what seemed reasonable to consider normal conditions. Nocturnal insects are of course less likely to be noticed in the act of oviposition, so it was with a great deal of satisfaction that a female *rutila* was observed thus engaged and too busy with the work in hand to mind an eavesdropper. With a nervous haste quite out of keeping with the lethargy previously displayed, she is now all animation. One is reminded of the prying movements of an ichneumon while searching out a host, or the wasps when gathering spiders for their mud houses. With antennæ in constant motion, all cracks and crevices that the plant stock afford are explored and such as furnish an apparently proper shelter may receive an ovum thrust well in out of harm's way. What seems to the onlooker as a needless amount of exploring is done, and one is struck with the important part the antennæ play in this. In the cases observed, oviposition did not occur after the third night, and the number of eggs were rather under the amount expected, never exceeding a hundred, although accuracy as to an exact count was quite out of the question. Having finished this function an exhaustion follows, in which the moth has hard work to keep an equilibrium, often falling to the ground and remaining with legs in air, feebly moving. Impelled by what we call instinct, she has now fulfilled her mission, and there remains the final tragedy which is close at hand. The average life of the imagoes of this group may be reckoned at from ten to fifteen days, the weather conditions, of course, figuring importantly, though it is likely the males often exceed this. The egg is less than spherical, flattened at the vertex so that the diameter here is less than the lateral measurement, which is .6 of a millimeter. It is ribbed very closely with rows of fine granulations, radiating from the vertex, which is indicated by a slight depression. Colour is pale, shading somewhat yellowish. They are deposited singly or in pairs. Examination of these ova in the early winter revealed the fact that all had hatched, thus adding another instance where the unexpected had happened. From the late date, we may presume hibernation occurs before the first moult, but as the wire cloth of the insectary offered no hindrance to such small fry, any statements here are mere guesswork.

Mature larvæ are very cylindrical; the longitudinal stripes, though faint, are traceable and unbroken; in this respect, as well as entire general appearance, it resembles *cataphracta* very strongly. The thoracic segments show very light, the rest of the body has the brownish body

colour more in evidence. The head, shield and plate are light in colour, shining, and of normal proportions. The spiracles are all black; the tubercles are umber and do not stand out very strongly. On thoracic joints two and three, I. a and I. b are hardly discernible; II. b, III. and IV. in their triangular setting are less noticeable than ordinary, the first named very small, the second intermediate, and the last large, of the size usually seen. On seventh abdominal segment IV. is situated at the upper corner of the spiracle, indicative of a root borer. All legs light, the crochets alone showing black. The head, lacking the side line, measures .12 inches across; the entire length of larva is 1.7 inches. Maturity is reached about August 19.

The pupa is very cylindrical; colour a light chestnut brown. There is little divergence from the usual form, though attention might be drawn to the conspicuousness of the eyes, showing darkly through the shell. The anal segment is also much darker. The cremaster consists of two sharp parallel spurs. Length .8 inches; duration of condition about twenty-eight days.

Previous to the pupal change the larva makes a slight attempt at lining or plugging a portion of its burrow with bits gnawed from the harder parts of the stalk and fastened with a few silken shreds, this acting as a sort of cushion upon which the pupa rests. This has been noticed occasionally with other species, but seems the rule with *rutila*. An irregular opening for the moth to escape is made through the epidermis, but this outer skin is left intact. In a few days it becomes black, looking like a blister or contusion, and offers a point upon which the collector may profitably work. There being no swellings and only an occasional dead stalk, it is often a hard matter finding these fellows.

Hydræcia impecuniosa, Grt.

Never for a moment had this species been considered as belonging to the local fauna: indeed, such a rarity seemed quite out of ordinary reach. The few scattering examples that had found their way into collections, though showing it widely distributed, were so insignificant in point of numbers that a "round-up" of goodly proportions was especially gratifying. The discovery of the larva savours so of luck, pure and simple, that a statement of the case may not be without interest.

The large number of *Hydræcia* larvæ that were desired for comparison last season made special effort necessary, and one day when gathering in a quantity of *cataphracta*, which happened in this case to be boring

wild parsnip, an *impecuniosa* larva was very unexpectedly forced upon our notice. That the parsnip stocks might the more easily be examined, for they were growing amidst a thick and tangled undergrowth, the stems were pulled up roots and all and were then split open carefully so as not to injure or lose the enclosed larva. By some chance a small weed was caught in the hand and came up by the roots along with the parsnip. Imagine the surprise when seeing at the base of this weed, which proves to be some kind of Aster, a large exit aperture, clearly the work of an *Hydraecia*, and inside a larva entirely new and quite ready for pupation. What it would prove was of course not known at the time, but it was gladly welcomed as extending an acquaintance to one more species. Later, several pupæ were secured, enough, presumably, to establish the identity of the species, the intention being that more complete observations be reserved for another year. Luckily one of the lot emerged very early, and knowing the species to be of such unusual occurrence, we deemed it well worth while giving up some time to further searches for more. Five hours spent the following day in a favourite resort brought ninety-seven pupæ to light, quite ready to give up the imagoes, having the wing-cases dark coloured by reason of the partly-formed organs within. Such a windfall was certainly very pleasing of itself, yet it could not but convey the unflattering conviction that with the supposedly careful work in former years this species had unquestionably existed all the while in a locality constantly examined and yearly giving up a goodly number of other species. Such an occurrence is but another point in the evidence that goes to show more depends on knowing where, than how, to look.

The food-plant is *Aster umbellatus*, and work is carried on mainly in the root, although the lower part of the stem is also tunnelled. Procedure is as usual, perhaps the strongest individual characteristic being the very large and irregular opening made for the moth's escape. This is situated an inch or so above the ground level, the stalk being often eaten half off through to the epidermis, and would surely fall were it not that it grows in such dense clusters the spreading branches of one plant help to support others. The epidermis, of tissue paper consistency, soon becomes dried and black, and as there are generally a number of perforations about the edge, it often shrinks, tears away at some point, then hanging as a hinged lid. There is not, however, any such accuracy of workmanship as is displayed by *necopina* in this act. Situated so conveniently, we might imagine these pupæ to be greatly exposed to the attacks of skunks and

other insectivorous marauders, but observations so far have noticed no such depredations. Though parasitic troubles seemed few, a good proportion fell victims to a fungous growth, this latter often assuming fantastic shapes as its development encloses the chrysalis. It may be that this fungus is not directed primarily against the insect, as its growth was often seen lining the whole interior of the burrow with a fine network of fibrous tendrils, and in many cases the ripe pupa, very much alive, was wriggling around upon a bed of this material. It was this feature, that of seeing a *live* pupa in direct touch with such apparent contamination, which seemed remarkable, for in all previous experiences where any mould or mildew was to be noted about a burrow the pupa would always be as dead as the proverbial door nail.

Eggs were obtained October 9th from females confined with the growing plants, and were practically identical with those of *rutila*, excepting the colour shades to greenish rather than to yellow. They are deposited in rows or clusters of a dozen or more, and, like that species, gave up the young larvæ in the late fall; just when, will have to be determined another year.

Mature larva: Size is small and at once separable from the other closely allied species. Its colour, a flesh tint, is purest white on the first three segments, and there is not the semi-transparency so usually noted. Head is of moderate proportions, a shining red russet in colour, and lacks the black side dash; measures .09 inches. Shield is lighter and yellowish, strongly edged at the sides with black. Anal plate large, darker in colour and blends with what is sometimes a preceding plate into one confused area. The body, while of the usual cylindrical build, shows a perceptible tapering on the last two joints. Tubercles prominent, shining black, and stand out contrastingly as in *purpurifascia*. On abdominal segments I. exceeds II. in every case, and IV. is notably large. The position of the latter on joint seven is high up above the corner of the spiracle, the apparent root-boring characteristic. The setæ are few and weak. Thoracic feet black, as are the crochets of the abdominal ones. Mature larva measures 1.3 inches. They change to pupæ August 15 to 25.

The pupa is of the usual glossy chestnut brown, very cylindrical; the indentations between the abdominal joints are slight; length .8 inch. A noticeable feature is the very dark hue assumed by the wing-cases just previous to emergence, the abdominal part retaining to the last the original light shade. Moths emerge about September 30.

The thoracic tufting of this species from its smaller size seems more prominent than in some others. Indeed, this character so noticeable throughout the group can only be fully appreciated by securing moths direct from pupæ and which have not marred their beauty here by flight. The rather loose, though ample, vesiture of the thorax is so well blended with certain ground colours of the primaries, together with minor peculiarities of the anterior tufts, that it is quite possible to separate the species by the thorax alone when unfaded, perfect material is at hand. This may seem a rather broad statement, yet it is the lack of perfect material that has resulted until recently in the confusion of certain species.

Mr. Grote, when conducting his studies in the earlier days, gives a figure (Papilio, pl. 1, Vol. II.) showing a profile view of *rigida* that illustrates nicely the proportions of this tufting.

Hydræcia Harrisii, Grt.

A number of mature larvæ of this species came into my possession last season, due to the kindness of Dr. Roland Thaxter, who has long had this insect under observation at Kittery Point, Maine. That section so far seems the only one which has produced this species in numbers; the examples in collections invariably bear that locality label. As its food-plant and early history have already been discussed by my donor who furnished the types for the original description, the references here will have only to deal with some of the tubercle arrangements which are of interest by way of comparison, for there were some suspicions at the start that it might prove a variety of *purpurifascia*. So great was the similarity between these larvæ and the one found working in *Cicuta* -both, in fact, being *Umbelliferæ* feeders—that it was thought possible the local and the Maine examples might be the same until emergence proved the contrary. Since, comparisons of blown larvæ have pointed out sufficient structural differences; but a slightly greater size in favour of *marginidens* seemed at first the only apparent discrepancy.

Mature larva: General dimensions are typical, colour the light indistinct translucence. A dorsal stripe is vaguely seen, apparently dependent on the pulsating internal fluids for accentuation. Head measures .11 inch across; shield and anal plate ordinary. Tubercles are

prominent, for the most part shining black. On thoracic joints two and three, III., IV., and V., are most prominent, placed in the conventional triangular form; III.a is in evidence on all abdominal segments before the spiracles. On the seventh one, IV. is below the spiracle in the usual noctuid position, and so differs in this important point from *purpurifascia*. Leg plates are ordinarily distinct. Extreme length 1.05 inches.

Of other Hydroecia species to be associated with these, there remain two known to occur at Rye, which have so far escaped notice in their earlier stages. These are *inquæsita*, G. & R., and the newly-described *circumlucens*, Sm. The former has a wide range and is represented in most collections, but one rarely sees a perfect example. It is a rather thinly-scaled species, and suffers so much from the effects of flight that it has long been sought in its larval state, so that perfect examples might be secured, for it is prettily shaded with the characteristic warm red-brown and purple of the group. It is probably a root feeder and confined to one variety of plant; just what one, though, remains as yet a nut to be cracked.

Circumlucens occurred to me some years ago, a single example having the temerity to fly in at an open window. It appears early in the season, ranges well northward, and may be considered an associate with *cerina* and *rigida*. A happy day, indeed, will it be when this species gives up its secret of food-plant and habit.

The few European species that are closely allied with the local ones under consideration seem equally scarce in collections there, as many of our species have heretofore been in American cabinets. This is likely due to ignorance of their early histories, and it may afford us some satisfaction to think we are at all abreast of our brethren on the other side, even in this small matter, since we are so far behind in a knowledge of life-histories generally. *Leucographa* as approaching our *rutila* and *xanthenes* slightly similar to *marginidens*, are robust insects and must have great burrowing larvæ, which have burrowed to good purpose, indeed, if they have escaped the generations of lepidopterists there who are ever on the lookout for fresh details.

NOTE ON THE GENUS DYARIA, NEUM.

In re-examining the old slide from which the figure of venation (Can. Ent., XXV., 214) accompanying the original description of this genus was made, I see distinctly three internal veins in the hind wings. It would appear as if one of them must have been obliterated by the balsam in the fresh mount, or else an error of observation was made. The correction refers the genus to the Pyralidæ and, according to Hampson's classification, to the Epipaschiinæ, where it appears allied to the Indian genus, Cœnodomus, Wals. (Hamps. Trans. Ent. Soc., Lond., 1896, 467.) I would not lay any stress on the apparent presence of the accessory cell in Dyaria. Vein 10 runs so closely approximated to the stalk of 6–9 that it is impossible to be sure whether there is a true anastomosis toward the tip or not in the single specimen mounted.

It is rather curious that the error in Mr. Neumoegen's figure has been exactly paralleled by Prof. Aurivillius, who figures *Alippa anomala* (= *Cœnodomus Hockingii*) with only two veins in the hind wings. He referred his genus to the Limacodidæ! This figure (Alippa = Cœnodomus) much more nearly resembles Dyaria than Hampson's does; in fact, there is no tangible difference, as he gives vein 6 stalked, and specially illustrates vein 10 running close to the stalk of 6–9, and nearly touching this at the bend before apex. He also italicizes the words, "vein 8 of hind wings touching 7 beyond the end of the cell." (Ent. Tid., XV., 176, 1894.)

At my request, Dr. Hulst has examined the type of Dyaria in the Neumoegen collection, and says: "Palpi upturned, thickly scaled in front, rather short, not over half of the front, end joint very inconspicuous, basal joint not hollowed out; maxillary palpi very small." In the ♀ before me the maxillary palpi are small, tufted with scales at the end. Of the antennæ, Dr. Hulst says "strongly bipectinate for two-thirds, then rather suddenly shortening, the rest filiform. Process present behind at base, fringed and crowned with long hairs." Dyaria may therefore be referred to the Pyralidæ near Cœnodomus. Its occurrence in North America needs verification, in spite of the positive statement published.

Harrison G. Dyar.

TWO NEW SPECIES OF JASSIDÆ.

BY HERBERT OSBORN, OHIO STATE UNIVERSITY, COLUMBUS.

Deltocephalus apicatus, n. sp.—Head and pronotum yellow; scutellum and elytra reddish fuscous, the latter with hyaline apex. Length to tip of elytra, ♀ and ♂, 3 mm.

Vertex about as long as width between the eyes, margin rounded, apex prominent; front with sides nearly parallel to below the antennæ, then curving sharply to the base of the clypeus; clypeus slightly narrowed to tip. Pronotum, width more than twice the length, lateral margin short, posterior margin straight. Elytra passing the abdomen, with fully formed apical areoles (macropterous), or reaching only to tip of abdomen, with the apical areoles very much abbreviated.

Colour: Vertex, face and most of the pronotum yellow; ocelli black; very faint whitish parallel lines on the posterior part of the vertex, and in some specimens faint arcs on the front; three whitish lines on the pronotum; more or less of posterior part of pronotum, all of scutellum, and the elytra as far as the apical transverse veins, reddish brown or fuscous, fading apically to hyaline or with all the apical areoles hyaline. Beneath, sordid yellow, with the venter washed with fuscous.

Genitalia: Ultimate ventral segment of the ♀ moderately long, the lateral border sloping, the hind border slightly bisinuate and with a spot each side of middle extending on to disk and giving a trilobate appearance to the border; pygofers nearly reaching tip of ovipositor, thickly set with bristles on posterior half. ♂ valve rather long, anterior border strongly curved and posterior border evenly rounded; plates long, nearly reaching tip of pygofers, contracting sharply from base to middle, then tapering uniformly to narrow tip; pygofers thick, white, thickly set with short bristles.

Described from eleven specimens, four ♀s and seven ♂s, representing localities as follows in Eastern U. S.: 1, Md. (Mally); 1, Riverton, N. J. (Johnson); 1, Hyattesville, Md. (Hine); 2, Washington, D. C. (Hine); 3, Woodstock, Vt.; and 2, College Park, Md. (Ball).

This is a very characteristic little species, and shows a distinct dimorphism in a form with shorter elytra with imperfect apical areoles.

Paramesus furcatus, n. sp.—Beautiful golden yellow, with milky hyaline spots on elytra. Median lobe of ventral segment furcate. Female length to tip of elytra, 7 mm.

Vertex smooth, slightly depressed behind sharp anterior margin,

obtusely angulate, half as long as width between eyes and one half longer at middle than next the eye; front smooth, sutures converging regularly to base of clypeus, which is slightly wider at apex than base. Pronotum with a rather deep sinuous impression parallel to the anterior border, behind which it is faintly rugulose, posterior border scarcely concave.

Colour: Vertex bright yellow, unmarked; face yellow, with a fine black line just beneath the border of the vertex and extending to beneath the ocelli. Pronotum golden yellow, with faint median milky line. Elytra fulvous yellow or golden with metallic lustre and numerous oval milky hyaline spots arranged between the nervures and in the areoles of apical portion, an oblique fulvous fascia from basal third of costa to tip of clavus. Beneath uniformly yellow, except tibial and tarsal spurs, claws and the tip of median process of last ventral segment, which are fulvous or reddish, the tarsal claws inclining to fuscous.

Genitalia: Last ventral segment with broad lateral lobes, the inner borders of which run nearly straight to base of median process, which is strong, shallowly furcate, the spurs turned dorsad.

Resembles *vitellinus* in general colour and marking, but distinguished by the more slender form, the more angular vertex, the more deeply cut median process of last ventral segment, as well as the more brilliant metallic golden colour and greater length.

Described from one female received from Mr. O. O. Stover, of Orono, Me., who collected it at Pownal, Me., August 31st, 1899.

CORRESPONDENCE.

Sir,—While I thoroughly concur in your decision to exclude all further discussion of the Cunea-Congrua question from the Canadian Entomologist, especially in view of the very personal character which the controversy has assumed, I trust you will grant me space for the following brief personal explanation.

My reference to the Boers of the Transvaal was not intended to be offensive, and I have personally the greatest admiration for the stubborn courage in support of a hopeless cause shown by those misguided men, but as Dr. Fyles appears to have considered it offensive I beg leave to withdraw it.

I did not mean to imply that it was heinous to suggest that Dr.

Riley might have confused two or more species, as that has been done by many eminent entomologists, but to make figures with sufficient latitude to include such distinct species as Hyphantria Punctatissima and Spilosoma Antigone would be much less excusable. I certainly appear to have misunderstood Dr. Fyles on one if not two minor points. It is strange that so many of us have misunderstood him. While I am considerably younger than Dr. Fyles, which, however, is hardly relevant to the controversy, I am perfectly aware of the meaning of "bilateral symmetry," and in my copy of Smith & Abbot the figures of Punctatissima are perfectly symmetrical and not at all as described by Dr. Fyles.

But when an author illustrates the larva of a species on its food-plant and figures the perfect insect on the same plate, does he really thereby imply that all stages are to be found on the same plant at one time? And might Mr. Edwards's magnificent plate of Melitæa Phaeton in But. N. A., Vol. II., be therefore properly described as "quite a fancy sketch"?

It is quite true that I have never had Dr. Fyles's specimen in my possession, he having refused to allow me to take any of his specimens to compare with Walker's types in the British Museum, but I have seen it several times as well as other specimens of the same species which I have seen in several museums which I have recently visited, and I have had Mr. Winn's two specimens of the same form in my possession for weeks together, he having kindly permitted me to carry them to New York, Philadelphia and Washington, and just recently to the British Museum.

Internal and external are antithetic terms, but superficial was quite properly used by me to denote a slight general resemblance in maculation which, however, in my opinion disappears upon a more careful study of the details.

HENRY H. LYMAN.

Montreal, 16th July, 1900.

SIR,—July 6th was a very hot day in Orillia, over 90° in the shade, and the night still remained very warm. I, as usual, was at my favourite occupation of collecting; I had made several trips to the places which I keep regularly covered with rum and molasses during the season. This evening there was literally no standing room for the myriads of moths which crowded each other to get at the sweets. *Hadena arctica* was swarming—never saw so many in my life, and I have had quite a few

years' experience at sugaring. At light and sugar this evening I could have taken some 58 species of moths, though of course nearly all were represented in my collection. I have succeeded each year during the last eight years in adding from 18 to 25 new Heterocera to my collection, and hope to beat the record this year, but I certainly received a genuine surprise this particular night. I had made two or three rounds with cyanide bottle *only*, when on nearing one sugar station something that appeared immense to me flew away from the locality. I thought at first it was Polyphemus, but what could it be doing at sugar? Then perhaps a Catocala—never saw one so large. Though I had no lamp, I was satisfied at last it was something new; went into the house and got my net and made several trips to the same spot—no results I said to myself, Well, I will wait for you, and sat down and lit a cigar. I was about two yards from the spot where I first saw the apparition. I waited patiently for about half an hour. Presently along came the same bat-like insect, and, after a few circles, alighted on the post and commenced sucking in the sugar along with the numerous moths—a giant among pigmies. As soon as it was at rest, I knew it at once as *Erebus odora*. I watched it feed awhile, a thing I never expected to see. After I netted it, I found it to be a fine female—looked as if it had just emerged from cocoon—abdomen was quite soft and scales in perfect condition. This I think, under the circumstances, is a very interesting capture, as I understand all previous ones made, in Canada at least, have occurred late in the fall and in out-of-the-way places, and it has been supposed they had wandered here from the South; but here is a perfectly fresh specimen, taken in the middle of summer, apparently quite at home and taking his sweets along with the rest of the Canadian moths. My own notion is it was bred in Orillia.

C. E. Grant, Orillia, Ont.

Mailed Sept 1st, 1900.

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THE PRINCIPLE WHICH UNDERLIES THE CHANGES IN THE NEURATION.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

In developing a general view of the changes in the neuration of the lepidopterous wing, the mass of detail in any one paper may obscure, for the reader, the statement of the assumed plan of progression. This seems to be, briefly, a simplification of the longitudinal systems of veining, and attained through a process of reduction. Where this progress would interfere with the serviceableness of the organ, the dormant tracheæ in the tegument may, in special cases, develop accessory veins, such as the humeral spurs of the Lachneids, the cross branches and extra veins in Tineides, and, as I have suggested, the so-called precostal spur (at one time vein I. of Comstock) on the hind wings of the diurnals. The cubital and discal cross-veins may be, however, survivals of a former system of cross-veins, since we apprehend them in various stages of retrogression. But they may be also what I call sub-secondary: produced at one time to be abandoned at another. Still, this latter is a rather violent theory. It is better to adopt the view that there is a general simplification going on controlled by mechanical causes and subsidiary to the habit and changes in habit of the organism, and which includes these two cross-veins.

In this general movement the participating logitudinal veins are as follows:

The branches of the radius.

These, on primaries, are still oftenest of the primitive number, five; on secondaries Comstock shows that the first radial branch survives some-

times as the outer margin of the humeral cell, fusing above with subcostal. The movement here is longitudinal, from base of wing outwardly to external margin. On the primaries some of the most specialized forms of Pierids and Lycænids have only three branches remaining. On the hind wings the radius is already two- or one-branched; the remainder of the five primitive branches have been lost in the higher lepidoptera, but retained in *Hepialus* and the Micropterygides. The details of the process by which the radial branches of the fore wings have been reduced in number become apparent through a comparison of their present position in the various genera.

The branches of the media,

which, as a rule three in number, alone survive of the system, are situated between cross-vein and outer margin of the wing. The base of the median system, as shown by Comstock, has disappeared and is again only exhibited in the Tineides. This base consisted of two, at least, longitudinal veins, which traversed the discal cell, and the traces of which are now to be found in certain backward spurs which remain attached to the cross-vein on its inner side. The reduction has taken place from the base outwardly. The branches themselves move upwardly or downwardly, attaching themselves to the system of the radius or that of the cubitus; the cross-vein degenerating as a further stage in the disappearance of the median system. For this is doomed. The wing tends to divide into two halves—the radius and its system, the cubitus and *its* system. To the first belongs naturally, by position, the subcostal vein; to the latter, the anal veins. The most perfect examples of this reduction are found in the Attacinæ. Take our common *Samia cecropia* or *Philosomia cynthia*. Here the cell has opened, the discal cross-vein has vanished, the branches of the media have attached themselves to the radial and cubital systems, deriving their nutrition from these, and the wing is centrally opened, from external margin to base, and free from veins. It presents now a certain coincidence with the embryonal or pupal wing, which is in itself curious, but need not detain us. We must finally notice the fact, that sometimes the branches refuse to follow the attraction of the upper and underlying systems. It is the middle or second median branchlet which is decisive. When this becomes radial, it follows the first median branch and attaches itself to the radial system. When it becomes cubital, it follows the third median branch and attaches itself to the cubital system. But sometimes it remains neutral. It will

not go either way, but obstinately retains its original primitive central position. This happens in the Skippers and Noctuids. The result is that the vein becomes isolated by the disintegration of the supporting discal cross-vein, a process which is never stayed. Then the second median branch, deprived of support and nutriment, fades away. For particulars of this theory of the movement of the median branches, see various articles issued by me in the years 1897 to 1899. The radial position is assumed by the Pierids and Nymphalids, also the Nemeobiidæ. The cubital, by the Papilionides and Dismorphians, which latter include *Leucophasia*. The central position is retained by the Skippers, apparently yielding to the cubital in the Megathymidæ. The movements of the radial branches and the median may be traced in all lepidoptera. Although I have worked them out chiefly from the diurnals, they are intelligible only as part of a system generally applicable All genera of butterflies show the wings in comparative stages of advance in this respect. For instance, let us compare the wings of *Parnassius* with those of *Papilio*. These movements, which are frozen in the Swallow-tails, are released in the Apollo butterfly and its kindred; in other words: *Parnassius* is seen to be here the specialized and *Papilio* the relatively generalized form I say *relatively*, because all these changes are gradual and one form must be compared with another to ascertain the difference in extent of these two movements. The grades are innumerable, established by the delicate differences of these natural instruments of measure. Another truth, which I have dwelt upon elsewhere, may now find its place: *The specializations*, of the two systems and of all other features in the wing, *are unequal*. This prevents snap judgment as to which is *ahead*, and which is *behind*, when we discuss the position of different groups and endeavor to establish it by a single feature. Rank is not an absolute and determinable condition in all cases; the specializations of moths may exceed those of butterflies. Moths may represent younger forms and butterflies may be older than we might suppose. We now come to

The anal veins,

which are theoretically four in number. The first anal (submedian fold) has disappeared as a vein, and appears only as a fold in most generalized forms. The fourth and third anal veins depart one after the other; the second anal is alone permanent. The Hesperiades have two anal veins remaining, the second and third; the Papilionides only one, the second.

The stationary veins

in the lepidopterous wing are, then, the subcostal, the main stem of the radius, the cubitus with its two invariable branches (cases occur in which a fourth median branch is noted), and the second anal vein.

It remains to state that accessory or secondarily developed veins always seem to be joined on to other veins, their object being to strengthen the tegument in some particular part of the wing which the changes above detailed have left weak. A curious way in which veins have become bent, in order to support the peculiar shape of the wing, has been detailed in my papers on the "Round-wing," *Pseudopontia paradoxa*. Another curious case is that of the fusion of the first and second radial branches, just before tip of fore wing, in *Pereute callinice*. The first radial here fails to reach the outer margin, and the object seems to be to strengthen the apical field, left weak by the reduction of the radial branches.

If this localization of the secondary veins, which I assume, be correct, it follows that all veins issuing from base of wing are, *ipso facto*, primary, carried over from primitive types of insects. The short, downwardly curved internal vein, which I have taken as the visible sign of the Papilionides, is, then, a true third anal vein, or what remains of one, and is not to be considered as of secondary origin and value.

TYPES OF NOCTUID GENERA.

BY A. RADCLIFFE GROTE, A. M.

In reference to my previous paper (page 209), Mr. Louis B. Prout kindly draws my attention to the fact that Duponchel, Lep. Ent., March, 1829, also selects *didyma* as type of *Apamea*, Ochs., 1816. While it is gratifying that I had come independently to the same conclusion with regard to this type, I cannot follow Duponchel's selection in other cases. I merely state the fact here, reserving details for a later occasion.

It further appears from Mr. Prout's researches that Curtis, who publishes later than Duponchel, viz., in May, 1829, "chooses *chrysographa*" as type of *Apamea*. Independent of the fact that this choice is rendered nugatory from Duponchel's prior action, I do not identify this name with certainty as referring to one of Ochsenheimer's original species of *Apamea*. Great confusion has been caused by the double employment of *nictitans* for two distinct forms. It was owing to the fact that I incorrectly supposed Ochsenheimer's *nictitans* (= oculea) was Linne's

species, our common *Hydræcia nictitans*, L. (=*americana*, Speyer ; *lusca*, Harris), that I used *Apamea* at one time for this species. The species *leucostigma*, type of *Hydræcia*, Led., formed one of Guenée's original species of *Hydræcia*, Guen., Noct. Eur. Index Meth., 1841, as also of Ochsenheimer's *Apamea*. But, in 1852, Guenée referred *leucostigma* back to *Apamea*, leaving *nictitans*, L., as type of *Hydræcia* by process of exhaustion.

Mr. Prout's kind communication does not affect the conclusions I have reached so far as to types of Noctuid genera.

NOMADA SAYI AND TWO RELATED NEW SPECIES.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

In Trans. Am. Ent. Soc., 20: 276, 1893, I described *Nomada Sayi* from eight female and fifteen male specimens. At present I have forty-five female and ninety male specimens which I have referred to this species, but which I now propose to describe under the three following names :

Nomada Sayi, Rob.— ♀. Mandibles simple, antennæ long, joint 4 longer than 3 or 5, as long as 12, or nearly so, pygidium rather broadly truncate ; scutellum sub-bilobed, prominent ; enclosure of metathorax coarsely reticulated at base, finely roughened beyond ; head and thorax closely and coarsely punctured ; abdomen shining, rather sparsely and finely punctured ; ferruginous, the scape, front and middle legs, tubercles and tegulæ, more yellowish ; about antennæ, about ocelli, occiput, band on mesonotum, middle of metathorax sometimes, band from wings to middle and hind coxæ, base of femora behind more or less, sometimes hind metatarsi, base of abdomen, sometimes apical margins of segments more or less, and sutures, generally black or blackish ; segments 2 and 3 of abdomen with a yellow spot on each side ; wings hyaline, marginal cell and apical margins clouded, basal nervure ending before transverse median. Length, 6–8 mm.

♂.—Resembles the female ; joint 4 of antennæ longer than 3 or 5, as long as 13, or nearly so, 5–8 sub-lobate at apex beneath ; pygidium bifid ; black, mandibles, labrum, clypeus, sometimes a spot above, inferior orbits as high as antennæ in front and usually at base behind, and scape in front, yellow ; sometimes a ferruginous spot at summit of eye ; flagellum yellowish ferruginous, except towards base above ; collar black or with a yellow or ferruginous interrupted line ; tubercles, tegulæ,

and usually a spot on pleura, yellow; scutellum black or ferruginous, or with two ferruginous or yellow spots; postscutellum usually black, sometimes ferruginous; legs, except base, especially behind on middle and hind pairs, ferruginous, front and middle legs more yellowish in front; abdomen except base and apical margins of segments more or less ferruginous, yellow marks on segments as follows: A spot on each side of 1–5, sometimes continuous, or nearly so, on 2, 4 and 5, sometimes broken in two on 4, often wanting on 1, 4 and 5, and a transverse spot on 6. Length, 6–8 mm.

Carlinville, Illinois; 18 ♀, 26 ♂ specimens.

Nomada Illinoensis, n. sp.—♀. Closely resembles female of N. Sayi; antennæ shorter, joint 4 longer than 3, a little longer than 5, distinctly shorter than 12; scutellum a little less prominent; pygidium broader, broadly rounded, not truncate, more densely and finely punctured, more densely clothed with appressed pubescence; sides of face below more yellow; abdomen with a spot on each side of segments 2 and 3; 5 with a transverse spot, usually divided, sometimes wanting. Length, 6–8 mm.

♂.—Resembles the male of N. Sayi; joint 4 of antennæ shorter than 13. Length, 6–8 mm.

Carlinville, Illinois; 26 ♀, 54 ♂ specimens.

Nomada parva, n. sp.—♀. Resembles the female of N. Illinoensis, but is a little smaller; joint 4 of antennæ longer than 3, about equalling 5, shorter than 12; abdomen with a yellow spot on each side of segments 2–5. Length, 5 mm.

♂.—Scape stout, joint 4 of antennæ longer than 3, a little longer than 5, much shorter than 13, 5–8 not sub-lobate at apex beneath; pygidium bifid; black, mandibles, labrum, clypeus except sometimes at base, lower anterior orbits, scape in front, flagellum except at base above, tubercles, tegulæ, sometimes a spot on pleura and legs in front, yellow; abdomen reddish, segments 4–6 more or less blackish; yellow markings on segments of abdomen as follows: A spot on each side of 2 and 3; one or two spots on each side of 4, sometimes wanting; a band on 5 narrowed or interrupted medially, and sometimes a spot on each extreme side, all sometimes wanting; a transverse spot on 6. Length, 5–6 mm.

Carlinville, Illinois; 1 ♀, 10 ♂ specimens.

N. Illinoensis ♀ may be distinguished from the female of *N. Sayi* by the form of the pygidium and the joints of antennæ. All of the specimens of *N. Sayi* ♀ have the abdomen four-spotted. In all except two specimens of *N. Illinoensis* ♀ the abdomen is five-spotted, or six-spotted, when the mark on segment 4 is broken in two. The single specimen of *N. parva* ♀ has the abdomen eight-spotted. I separate the ♂ of *N. Illinoensis* from that of *N. Sayi* by the joints of antennæ. In *N. parva* ♂ the scape is stouter, and the ornaments of abdomen are different.

N. Sayi is closely related to *N. Cressonii*, differing mainly in size and colour.

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 3.—Continued from page 188.)

Subfamily II.—Ageniinæ.

The majority of the species falling in this subfamily are usually smaller and much less conspicuous than those in the other subfamilies, and with totally different habits. None are true diggers, but, on the contrary, build small oblong, or oval, clay cells, beneath the loose bark of old trees, under stones, or in crevices in old stone walls, etc., not unlike some of the Potter wasps *(Eumenidæ)*.

The group comes evidently nearest to the *Pepsinæ*, the females having, as in that group, a transverse grooved line, impression or emargination on the second ventral segment. From that group, however, it is at once separated by the difference in the legs, the hind tibiæ being smooth, never serrate or spinous, or with a longitudinal ridge, but, at the most, with only a few very minute, scarcely perceptible spines.

These characters readily distinguish the *Ageniinæ* from all other Pompilids.

The beginner at first might possibly confuse some males in this group with some small males belonging in the subfamily *Pompilinæ*, since there is a superficial resemblance in some, but strongly spined legs, always existing in the males of the latter group, ought readily to differentiate the two.

Only five genera fall into this group, distinguishable as follows:

Table of Genera.

Cubitus in hind wings *interstitial* with the transverse median nervure..2.

Cubitus in hind wings originating *beyond* the transverse median nervure..4.

2. Mesosternum normal, unarmed.....3.

Mesosternum armed with a large conical tooth or spine just before the middle coxæ.

Second and third cubital cells along the cubitus subequal, the third the broadest; femora in ♂ much thickened.....(1) Macromeris, Lepel.

3. Second and third cubital cells equal, or very nearly, united only about as long as the first.

Mandibles simple, edentate; antennæ in ♂ with the flagellar joints pectinate (♀ unknown).....(2) Clavelia, Lucas.

Mandibles bidentate; antennæ in ♂ normal, the hind coxæ produced anteriorly into a conical tubercle, in ♀ simple; metathorax with a median longitudinal furrow.....(3) Paragenia, Bingham.

Second cubital cell much shorter than the third; clypeus usually triangular, more or less prominently pointed, subconvex medially; mandibles dentate; antennæ filiform.....(4) Pseudagenia, Kohl.

4. Third cubital cell along the cubitus, as long or a little longer than the second; claws cleft or with a tooth near the middle, rarely simple; eyes extending to base of mandibles; abdomen with a constriction between segments 1 and 2.

Body variable; head transverse, wider than the thorax; maxillæ in ♀ with a bunch of long, beardlike hairs at base; abdomen ovoid, sessile, subsessile, or briefly petiolate; claws cleft or with a tooth beneath.....(5) Agenia, Schiödte. = Pogonius, Dahlb.

Body very slender; head lenticular; maxillæ in ♀ normal, not bearded; abdomen very long, subcompressed, clavate, the first segment distinctly petiolate; claws simple.....(6) Stenagenia, Saussure.

THE NEW MEXICO BEES OF THE GENUS CŒLIOXYS.

BY T. D. A. COCKERELL, EAST LAS VEGAS, N. MEX.

Table to separate the females :

Legs red ..... 1.
Legs black, or only tarsi red ..... 4.
1. Anterior edge of clypeus deeply emarginate ..... *Sayi*, Rob.
Anterior edge of clypeus not emarginate ..... 2.
2. Ventral apical plate of abdomen broad ; dorsal abdominal segments closely punctured in the middle ..... *deplanata*, Cress.
Ventral apical plate of abdomen narrow ..... 3.
3. Base of abdomen black ; dorsal abdominal segments rather closely punctured in middle ..... *octodentata*, Say.
Base of abdomen red ; dorsal abdominal segments very sparsely punctured in middle ..... *menthæ*, Ckll.
4. Apical dorsal plate prominently angled at sides .. *rufitarsis*, Smith.
Apical dorsal plate not angled at sides ..... 5.
5. Apical ventral plate long and narrow, notched at sides near end .. 6.
Apical ventral plate broad, suboval, more or less hairy at sides .. 7.
6. Lateral teeth of scutellum short and blunt ; tegulæ black ; length about 9 mm ..... *mœsta*, Cress.
Lateral teeth of scutellum longer and sharper ; tegulæ dark reddish ; length about 12 mm ..... *Porterœ*, Ckll.
7. Apex of ventral plate with a very small projection ; apex of dorsal plate curved upwards ..... *Gilensis*, Ckll.
Apex of ventral plate with a large projection ; apex of dorsal plate not curved upwards ..... 8.
Apex of ventral plate without a projection ; apex of dorsal plate not curved upwards ..... *Apacheorum*, Ckll.
8. Lateral teeth of scutellum long, somewhat curved inwards ..... *grindeliæ*, Ckll.
Lateral teeth of scutellum shorter, slender, straight ... *ribis*, Ckll.

Cœlioxys Sayi, Robertson, 1897.

Las Cruces, June 12. Resembles *octodentata*, but easily separated by the clypeus.

Cœlioxys deplanata, Cresson, 1878.

Mesilla, June 30 ; Mesilla Park, October 14.

Cœlioxys octodentata, Say, 1824, (*altilis*, Cress.).

Santa Fé, July 6, at flowers of *Rudbeckia laciniata ;* July 27 ; Albuquerque ; Las Vegas, August 11, taken by Miss S. L. Mize, on

flowers of *Grindelia squarrosa;* West Fork Gila River, taken by Townsend, July 12. A male from flowers of *Aster spinosus* at Mesilla, July 25, is inseparable from males of *octodentata.*

Cœlioxys menthæ, Ckll., 1897.

♂. Deming. ♀. Las Cruces, August 11 and August 23, the last at flowers of *Chrysopsis villosa;* both taken by C. H. T. Townsend. The ♀ is about 12 mm. long; the apical plates of the abdomen are of the same general type as those of *octodentata*, but longer, and the dorsal plate does not fall much short of the ventral. The bands of pubescence along the front of the mesothorax, and in the scutello-mesothoracic suture, are of a light warm ochreous colour. The abdominal bands are entire and regular.

Cœlioxys rufitarsis, Smith, 1854.

♀. Rio Ruidoso, about 7,500 feet, August 3, at flowers of *Verbena Macdougali.* This specimen, collected by Townsend, differs from Smith's description by the black nervures, and tegulæ not testaceous in the middle, but it accords herein with *rufitarsis* as understood by Cresson. The tarsi are red. What I regard as the ♂ of this occurred at Las Vegas, July 11, at flowers of *Cleome serrulata.* It is larger than *C. Gilensis.*

Cœlioxys mœsta, Cresson, 1864.

Beulah, end of August.

Cœlioxys (lucrosa var. ?) *Porteræ*, n. sp.

♀. Harvey's Ranch, near Las Vegas, 9,600 feet, August 22, 1899. (Wilmatte Porter.) Length about 12 mm. Pubescence white; short but rather dense on cheeks; short and mostly appressed on face; abundant on sides of thorax and on metathorax; erect, scanty and inconspicuous on vertex, mesothorax and scutellum; no band on anterior margin of mesothorax, and only a very slight one at scutello-mesothoracic suture; legs, except coxæ, scarcely pubescent, four hind tarsi clothed with fulvous hair on inner side; abdominal bands narrow, not very conspicuous, inclined to be more or less interrupted in the middle; antennæ and mandibles entirely black; tegulæ dark reddish-brown; wings brownish; punctures of vertex, mesothorax and scutellum dense, large and deep, scutellum becoming cancellate; edge of scutellum only gently convex, with no central nodule, lateral teeth moderate, straight; abdomen shining, punctures sparse on greater part of segments 2 to 4; segments 2 and 3 with a transverse groove; ventral surface with distinct,

rather close punctures; penultimate ventral segment minutely roughened with dense punctures of two sizes; apical plates much as in *lucrosa*, but the dorsal plate has the narrowing nearer the base, and its keel is distinct; the ventral plate appears to be rather more produced. Close to *lucrosa* and *mœsta*, but probably a distinct species.

Cœlioxys Gilensis, Ckll., 1898.

Length: ♂, 9–10 mm.; ♀, 11 mm. The discovery of the female shows that this species is very close to *C. modesta*, Smith, but differs in the colour of the legs and the entire abdominal bands. ♀. Gallinas River at La Cueva, at flowers of *Psoralea tenuiflora*, August 6 (Ckll.); Rio Ruidoso, at flowers of *Vicia* aff. *pulchella*, about 6,700 feet, July 29 (Townsend). ♂. Rio Ruidoso, with the ♀s just cited, also at flowers of *Rhus glabra*, about 6,500 feet, July 19 (Townsend); Gila River (Townsend); Santa Fé, July 6 (Ckll.). The males resemble *rufitarsis*, but are uniformly smaller.

Cœlioxys Apacheorum, n. sp.

Mescalero, July 20 (C. M. Barber). ♀. Somewhat related to *C. alternata*, Say, as interpreted by Cresson. Length 11 mm., narrow, with the shape of *C. Gilensis;* pubescence dull white; face quite densely pubescent; anterior border of mesothorax with the band of pubescence divided behind into three teeth, the lateral ones the most distinct; scutellum with hind edge strongly convex, without a central nodule; lateral teeth long and almost straight; antennæ and mandibles black; legs black, including tarsi; spurs dark ferruginous; punctures of mesothorax and scutellum large and deep; wings strongly suffused with brown; nervures black, stigma ferruginous; tegulæ ferruginous, piceous at base; abdomen shining dorsally, with strong but sparse punctures; abdominal bands regular and entire; additional bands of hair at the sides of the segments, marking the transverse depressions, which, however, entirely fail broadly in the middle of the dorsum; ventral surface strongly and rather closely punctured, the penultimate segment with small punctures interspersed between the large ones; apical dorsal segment ending in a point at an angle of perhaps 80°, the longitudinal keel wanting, or slightly indicated at the tip; apical ventral segment not greatly produced beyond the dorsal, rounded, its margins hairy.

This species is peculiar for the absence of a keel or raised line on the last dorsal segment, and the broad interruption of the transverse grooves on segments 2 and 3. Using these characters, our species of *Cœlioxys* separate thus:

A. Keel on last dorsal absent ..... *Apacheorum.*
B. Keel on last dorsal extending about half the length of the segment; transverse grooves on 2 and 3 entire..... *octodentata, Sayi.*
C. Keel on last dorsal extending about three-quarters the length of the segment.
  a. Transverse grooves on 2 and 3 interrupted in middle line..... *mœsta.*
  b. Transverse grooves on 2 and 3 entire..... *deplanata, ribis, rufitarsis, Porteræ.*
D. Keel on last dorsal extending practically the whole length of the segment.
  a. Transverse grooves on 2 and 3 entire..... *grindeliæ.*
  b. Transverse grooves on 2 and 3 broadly interrupted dorsally..... *menthæ, Gilensis.*

Cœlioxys grindeliæ, n. sp.

Las Vegas, at flowers of *Grindelia squarrosa*, August 9, both sexes (W. Porter); August 11, ♂ (S. L. Mize).

Las Vegas, at flowers of *Solidago Canadensis*, August 11, ♂ (W. Porter); Las Vegas Hot Springs.

♀. Length about 11 mm.; pubescence pale with a brownish tinge, that along anterior margin of mesothorax (especially at sides) and a spot behind tegulæ, pale ferruginous; disc of mesothorax and scutellum nude; abdominal bands rather broad, entire and conspicuous, no short lateral transverse grooves or bands, but transverse grooves crossing the dorsum of segments 2 and 3; mandibles externally covered with appressed pubescence like the face (this is also the case in *ribis*); antennæ and tegulæ black; legs black, including tarsi; nervures and stigma black; wings with the outer margin broadly brown; mesothorax cancellate with extremely dense large punctures; lateral teeth of scutellum long; abdomen rather sparsely punctured; penultimate ventral segment punctured like the others, without the minute punctures interspersed; last dorsal segment densely punctured, with a strong raised line going as far as the articulating base; apical ventral segment longer than dorsal, broad, hairy at sides, with a broad apical pointed projection.

♂. Similar to the ♀, except in the usual sexual characters; pubescence often whiter than in ♀; end of abdomen with eight teeth, those on the fifth segment being well developed.

The punctuation of the penultimate ventral segment in the ♀ is diverse in the different species; thus in *rufitarsis*, *Porteræ* and *Apacheorum* there are numerous small punctures interspersed among the large ones; in *menthæ*, *Gilensis* and *grindeliæ* the punctures are large, on a shining surface, without little ones interspersed; in *deplanata*, *ribis* and *mœsta* the punctures are small and very dense posteriorly, and larger and well separated on the anterior part of the segment.

Cœlioxys ribis, n. sp.

Romeroville, Aprii 29, 1899, at flowers of wild gooseberry (Wilmatte Porter). ♀. Length about 11 mm., rather broad, superficially like *C. grindeliæ*, but the abdomen tapers more rapidiy; the pubescence is white; the hair on the eyes is very long (it is very short in *grindeliæ*); the inner orbital margins diverge much more above; the punctures of the mesothorax are sparser in the middle, leaving some shining surface between; the teeth of the scutellum are shorter; the apical projection of the last ventral segment is longer and narrower; the mesothorax is quite hairy, but has no distinct hair-patches; the penultimate ventral segment is dull, roughened with excessively close minute punctures posteriorly, sparsely punctured anteriorly.

SYNOPSIS OF FOOD-HABITS OF THE LARVÆ OF THE SESIIDÆ.

BY WILLIAM BEUTENMÜLLER, NEW YORK.

The larvæ are universally borers, but in the choice of food-plants there is the widest diversity; some bore through and devour solid wood, as do the larvæ of the Cossids; some prefer the pith of woody stems; others are found in the superficial woody layers; still others affect the roots of plants both woody and herbaceous, or are sometimes to be found in the borings made by other insects, as is the case with *Memythrus tricinctus*, *Sesia pictipes*, *S. scitula*, and others. The larvæ are yellowish or dirty white, beset with only a few short hairs. The head and cervical shield are chestnut brown. They hibernate in various stages of growth, but do not overwinter in the pupal stage, as far as the species of the northern States are concerned. The larvæ of *Melittia satyriniformis* hibernate fully grown in the cocoons. When fully developed they spin elongate oval cocoons composed of chips cemented together by a gummy secretion or silk. The cocoons are formed in the burrows or in contiguous places.

Boring in trees.

Under bark of trunks some distance from the base or in the branches :

Maple	*Sesia acerni.*
Maple	" *corni.*
Apple, Pear	" *pyri.*
Dogwood, Oak, Chestnut	" *scitula.*
Alder	" *Americana.*
Cherry, Plum, Juneberry	" *pictipes.*
Pine, Redwood *(Sequoia)*	*Vespamima sequoiæ.*
Pine and Spruce	*Parharmonia pini.*

Under bark at base of trunk or main roots :

Peach, Cherry, Plum, Apricot, etc.	*Sanninoidea exitiosa.*
Peach and Cherry	" *opalescens.*
Peach, Cherry	" *Graefii.*

In solid wood of trunks :

Ash	*Podosesia syringæ.*
Ash	" *fraxini.*
Oak	*Memythrus simulans.*
Cottonwood	*Ægeria pacifica.*
Cottonwood and Locust	*Memythrus robiniæ.*
Poplar	" *Dollii.*
Willow and Poplar	" *tricinctus.*
Willow	*Sesia Bolteri.*
Willow	" *albicornis.*

In solid wood at base of trunks and roots of trees :

Persimmon	*Sannina uroceriformis.*
Willow and Poplar	*Ægeria apiformis.*
Willow	" *tibialis.*
Ash, Alder	*Memythrus asilipennis.*

Boring in shrubs.

In solid wood :

Lilac	*Podosesia syringæ.*

In pith of stems :

Currant, Gooseberry	*Sesia tipuliformis.*

In roots :

Blackberry and Raspberry	*Sesia rutilans.*
Blackberry and Raspberry	*Bembecia marginata.*
Sumac	*Melittia gloriosa.*

Boring in vines and creeping plants.

In the stems :

Squash, Pumpkin, and other Cucurbs ..... *Melittia satyriniformis.*

Big-root *(Megarrhiza)* ..... " *gloriosa.*

In roots :

Grapevine ..... *Memythrus polistiformis.*

Clematis ..... *Alcathoe caudata.*

Clematis ..... " *korites.*

Herbaceous perennial plants.

In roots :

Strawberry ..... *Sesia rutilans.*

In stem :

Eupatorium ..... *Sesia lustrans.*

In borings of other insects :

Oak-gall *(Andricus cornigerus)* ..... *Sesia scitula.*

Oak-gall *(Andricus cornigerus)* ..... " *rubristigma.*

Gall on Live Oak ..... " *querci.*

Gall on Oak ..... " *sapygæformis.*

Gall on Mesquite ..... " *prosopis.*

Gall of *Saperda concolor* ..... " *albicornis.*

Gall of *Saperda concolor* ..... *Memythrus tricinctus.*

NOTES ON COLORADO BEES.

BY E. S. G. TITUS, FORT COLLINS, COLO.

The following table is intended to serve as a means of separating the species of the genus Agapostemon, Smith, occurring in Colorado :

Body green or blue-green.

A. Abdomen unicolorous with body.

B. Mesonotum with double punctuation ..... Texanus, Cress. ♀.

BB. Mesonotum with confluent punctures, metathorax longitudinally rugose ..... radiatus, Say. ♀.

AA. Abdomen differing in colour from body.

B. Abdomen black.

C. Abdomen yellow banded.

D. With five bands.

E. Last ventral segment with a median carina ..... viridulus, Fab. ♂.

EE. Last ventral segment without a median carina ..... Texanus, Cress. ♂.

DD. With six bands.....radiatus, Say. ♂.
CC. With white hair-bands.....viridulus, Fab. ♀.
BB. Abdomen honey-yellow.....melliventris, Cress. ♀.
BBB. Abdomen yellow, with very narrow black bands.....melliventris, Cress. ♂.

The males of radiatus, Texanus and viridulus are hard to satisfactorily separate. That portion of the table relating to them has been formed almost wholly from a study of the excellent paper of Mr. Chas. Robertson, North American Bees, Desc. and Syns.*, in connection with the study of the males in the collection of the Colo. Agr'l College. Specimens of male and female of radiatus, Texanus and viridulus were sent to Mr. Robertson, who kindly looked them over and verified or, where necessary, corrected my determinations.

The following is a list of the specimens now in the College collections :

Agapostemon viridulus, Fab., 1793.

Thirty-five females ; Trinidad, Ft. Collins and Poudre Canon.

Ten males ; Poudre Canon and Ft. Collins.

Taken on Salix, Taraxicum, Geranium, Opuntia and several Cruciferæ.

Agapostemon radiatus, Say, 1837.

Two females, Delta ; two males, Montrose and Salida (Gillette), and one male, Poudre Forks (Laura Armstrong).

Females taken on Salix.

Agapostemon Texanus, Cress., 1872.

Seventy-four females ; Greeley, Lamar, Dolores, Trinidad, Ft. Collins and Rist Canon.

Twenty males ; Julesburg (Ball), Greeley, Fort Collins and Rist Canon. This species has been taken on Malvastrum coccinium, Salix, Taraxicum, Geranium and Cnicus.

Agapostemon melliventris, Cress., 1874.

One female at Delta, Colo., 27-v.-00, on Salix, by Prof. Gillette.

There are also in the collection a female taken in Mesilla Valley, N. M., on Solanum, and a male from Las Cruces, N. M., on Solidago, both from Prof. Cockerell.

Colletes nigrifrons, n. sp. ♀.

Length, 7–8 mm. Black, rather heavy set ; head broad, clypeus

*Trans. Acad. Sc., St. Louis, VII., No. 14, 1897.

prominent, punctures larger than on rest of face, partly confluent ; face covered with short black hair ; labrum with a distinct median depression ; mandibles black, tips rufo-testaceous, notch one-fifth of length from the blunt tip, strongly grooved without, space between eyes and base of mandibles not as great as width of latter ; antennæ short, black, flagellum deep brown beneath, reaching to line of tegulæ ; cheeks sparsely fringed with short, black hair ; dorsum of the thorax with short, sooty hair, some black hair intermixed in spots, disc shiny, sparsely pubescent ; pleura with black hair ; thorax quite evenly sparsely punctured, post-scutellum more finely punctured, base of metathorax with transverse series of pits, triangle shining, not smooth ; tegulæ shining, distinctly piceous : wings hyaline, nervures and stigma testaceous, marginal cell very dark, second submarginal narrow at top, third not narrowed as much as usual in one specimen ; legs black with sooty pubescence, tarsi reddish with rufo-testaceous hair, first joint very dark ; abdomen black, punctured, first two segments shining, white hair-bands on segments 1–5, on 1 and 2 interrupted, otherwise sparsely pubescent with black hair, venter with very short black hair.

Described from two females : Ft. Collins, Colo., 6-viii.-96 (Gillette), and Horsetooth Mt., Colo., 22-vi.-99, on Potentilla. This species differs from known Colorado species by the black hair on the face and pleura and the sooty hair on thorax. Prof. Cockerell writes that it is closely related to C. pascoensis. Ckll., from Washington ; but differs by its smaller size and by possessing hair-bands.

I wish to acknowledge the kindness of Prof. Cockerell and Mr. Robertson for favours shown me in revising portions of my manuscript, and for the general help they have given me.

NOTES ON SOME NORTH AMERICAN SPECIES OF TINEIDÆ.

BY HARRISON G. DYAR, WASHINGTON, D. C.

About the time that Lord Walsingham's valuable paper on Acrolophus and Anaphora appeared (Trans. Ent. Soc., Lond., 1887, 137–173), Mr. Beutenmüller was working on the same group ; but neither author has since attempted to recognize the species named by the other, so far as I am aware. In Prof. Smith's List Lep. Bor. Amer., 1891, the group is recognized as a family—Anaphoridæ—but this can hardly stand. The genera will fall in the Tineidæ, in the more restricted sense (see Walsing-

ham, Proc. Zool. Soc., London, 1897, 139–175). The following synopsis of genera is from Walsingham, with addition of two genera described since the original publication :

ANAPHORINÆ.

Palpi erect or slightly recurved.
  Veins 8 and 9 of fore wing stalked.
    Palpi erect ..... *Eulepiste.*
    Palpi appressed to head ..... *Neolophus.*
  Veins 8 and 9 separate.
    Antennæ bipectinate ..... *Ankistrophorus.*
    Antennæ simple or serrate towards apex.
      Tarsal joints of hind legs strongly fringed above ... *Thysanoskelis.*
      Tarsal joints not fringed above.
        Palpi erect, with separate tufts on each joint ..... *Ortholophus.*
        Palpi slightly recurved, uniformly hirsute ..... *Pseudanaphora.*
Palpi strongly recurved.
  Antennæ bipectinate ..... *Felderia.*
  Antennæ serrate throughout.
    Veins 8 and 9 of fore wings stalked ..... *Cænogenes.*
    Veins 8 and 9 of fore wings separate ..... *Anaphora.*
  Antennæ simple, compressed, or slightly serrate at ends.
    Veins 7 and 8 of fore wings stalked ..... *Atopocera.*
    Veins 8 and 9 of fore wings stalked.
      Head with an erect crest ..... *Urbara.*
      Head without an erect crest ..... *Hypoclopus.*
    No veins of fore wings stalked.
      Palpi roughly clothed throughout.
        An erect fringe along lower margin of cell on hind wings ..... *Pilanaphora.*
        No such erect fringe on hind wings ..... *Acrolophus.*
      Palpi smooth, the last joint only tufted ..... *Stœberhinus.*

Genus EULEPISTE, Walsingham.

Wals., Trans. Am. Ent. Soc., X., 169, 1882 ; Trans. Ent. Soc., Lond., 1887, 142.

Synopsis of Species.

Uncus single, the opposing lower limb not half as long as the upper limb.
  Harpes concave, rounded at the ends ..... *Cressoni.*
  Harpes concave, obliquely truncate above ..... *maculifer.*

Uncus single, its opposing lower limb nearly as long as the upper and stouter.

Harpes nearly flat, the ends bent inward, rounded. . . . . *Cockerelli.*

Eulepiste Cockerelli, n. sp.

Palpi upturned in front of the head, free, as high as the vertex; male antennæ simple, slightly serrated toward the ends; veins 8 and 9 of fore wing stalked; thorax and fore wings dark brown-gray, somewhat grizzled or mottled with darker and with an obscure darker spot at the end of the cell. Hind wings dark brown; abdomen gray-brown; expanse 16 mm. One male, Mesilla Park, New Mexico, at light, July 8th (T. D. A. Cockerell); U. S. Nat. Mus., Type No. 4417.

Genus Hypoclopus, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, 141.

Synopsis of Species.

Uncus single, down curved, broad at base, tip pointed; harpes broad, narrow at base, squarely truncate . . . . . *griseus.*

Uncus double, the two points separate, sharply down curved, the ends bent outward, enlarged and rounded; harpes long, narrow and uniform . . . . . *mortipennellus.*

Hypoclopus griseus, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, 144.

Arizona (Morrison, from Lord Walsingham, through C. V. Riley); San Diego, Texas, May 9 (E. A. Schwarz); Oracle, Arizona, June 28 (E. A. Schwarz); Brownsville, Texas, Apr. 27 (C. H. T. Townsend); Washington, D. C., July 20 (A. Busck).

The Texas specimens are pale, the ground colour an ashy white, on which the dark specks and streaks show plainly. The specimen from Oracle, Ariz., is very dark, the black markings predominating.

Hypoclopus mortipennellus, Grote.

Grote, Can. Ent., IV., 137, 1872; XVIII., 199, 1886. Wals., Trans. Am. Ent. Soc., X., 167, 1882; Trans. Ent. Soc., Lond., 1887, 150; *quadripunctellus*, Beut. (ined.). Smith's List Lep. Bor. Amer., No. 5057, 1891.

This species, described as Anaphora and placed by Lord Walsingham in Acrolophus, may be removed to Hypoclopus, as a majority of the specimens have veins 7 and 8 of fore wings stalked, at least on one side. Of twelve specimens before me, seven have these veins stalked on

both sides, two stalked on one side, separate on the other, and two separate on both sides, though approximate at base. The form of the male genitalia is peculiar and exactly alike in both those specimens with the veins stalked and with them separate. In size and markings they are also inseparable.

Lord Walsingham remarks about a specimen with veins 8 and 9 stalked, in two places in his article (pages 151 and 155), and refers it in one place to Neolophus, in the other to Cænogenes; but the antennæ are serrate only towards the tip, and the male palpi are strongly recurved, so that neither of these references seems admissible.

Texas (coll. Beutenmüller, type of *quadripunctellus*); Texas, Sept. 20 (Belfrage); Central Missouri, Aug. 12 and 15 (coll. C. V. Riley); Kansas (Crevecœur); Georgia (coll. Beutenmüller); Texas (coll. Beutenmüller, labelled "compared with type of *A. mortipenella* at Cambridge, Mass.").

Genus ACROLOPHUS, Poey.

Poey, Cent. Lep., Cuba, 1832; Wals., Trans. Ent. Soc., Lond., 1887, 147.

Synopsis of Species.

Uncus single, broad at base, the tip sharp.
  Harpes slender, concave, obliquely truncate above ..... *simulatus.*
Uncus double.
  With supplementary lateral processes ..... *plumifrontellus.* / *cervinus.*
  Without such processes.
    Harpes slender, concave, uniform.
      Tips of uncus down curved, separate ..... *Texanellus.*
      Tips of uncus straight, bent only at base, more nearly approximate ..... *Hulstellus.*
    Harpes spoon-shaped, narrowed at base.
      Uncus with a tooth below at the base ..... *Arizonellus.* / *violaceellus.*

Acrolophus cervinus, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, 151; *angustipenellus*, Beut., Ent. Amer., III., 140, 1887; Smith's List Lep. Bor. Amer., No. 5049, 1891.

The genitalia of this form do not differ perceptibly from those of *plumifrontellus*, Clem. The moths are smaller, paler and less strongly marked, somewhat narrower winged; but I doubt the specific distinctness of the form.

Florida (coll. Beutenmüller, type of *angustipenellus*); Georgia (coll. Beutenmüller); Orange Co., Florida (coll. Beutenmüller); Texas (Boll. coll. C. V. Riley, identified by Walsingham); Columbus, Texas, June (E. A. Schwarz).

Acrolophus violaceellus, Beutenmüller.

Beut., Ent. Amer., III., 139, 1887.

The genitalia are not very different from those of *Arizonellus*, Wals., though the harpes may be somewhat slenderer. However, the moth differs in its uniform, unspotted, purplish colour.

North Carolina (Beutenmüller's types); Iowa (from Dept. Agriculture).

Acrolophus Arizonellus, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, 153.

Arizona (Morrison, from Lord Walsingham, through C. V. Riley); Mesilla, New Mexico, June 25 and July 1 (T. D. A. Cockerell); Tucson, Arizona, July 19, 20 and 21 (E. A. Schwarz).

Genus Anaphora, Clemens.

Clem., Proc. Ac. Nat. Sci., Phil., 1859, 261; Wals., Trans. Ent. Soc., Lond., 1887, 155.

Anaphora popeanella, Clemens.

Clem., Proc. Ac. Nat. Sci., Phil., 1859, 261; Wals., Trans. Ent. Soc., Lond., 1887, 161 (references and synonymy); Riley, Smith's List Lep. Bor. Am., No. 5061, 1891; *confusellus*, Beut. (ined.), Smith's List Lep. Bor. Am., No. 5056, 1891.

The form *confusellus* is smaller than the usual form, the ground colour lighter and more purplish, the dark marks strongly relieved. In genitalia there is no marked difference. The form differs from *popeanella* about as much as *Acrolophus cervinus*, Wals., does from *A. plumifrontellus*, Clem. U. S. Nat. Mus., type No. 405.

Georgia (Beutenmüller's type); Kirkwood, Missouri? (labelled only "145 M," *i. e.*, Murtfeldt); Georgia (A. Oemler, labelled "Anaphora, n. sp., Wlsm., '86"); Georgia (labelled "Anaphora, n. sp., doubtless = *plumifrontellus*, C. V. R., '86, with Wlsm."); eight specimens, badly worn (labelled only "667, Aug., '80, coll. C. V. Riley").

Genus Felderia, Walsingham.

Wals. Trans. Ent. Soc., Lond., 1887, 165.

Felderia filicornis, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, 165; *Mexicanellus*, Beut., Ent. Amer., IV., 29, 1888.

Arizona (Morrison, from Lord Walsingham, through C. V. Riley); City of Mexico (Beutenmüller's type of *Mexicanellus*); Oracle, Arizona, July 12 (E. A. Schwarz); Fort Grant, Arizona, July 20 (H. G. Hubbard); Brownsville, Texas, June 10 (C. H. T. Townsend).

Genus ORTHOLOPHUS, Walsingham.

Orthlophus variabilis, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, 169.

Arizona (Morrison, from Lord Walsingham, through C. V. Riley); Arizona (coll. Beutenmüller); Arizona (yellow labels 5, 7 and 8 marked "prob. undescribed," Wlsm, 1886); Oracle, Arizona, July 8, 10, 12, 16 and 24 (E. A. Schwarz); Fort Grant, Arizona, July 19, 20 and 22 (H. G. Hubbard); Tucson, Arizona, July 21 (E. A. Schwarz); Chiricahua Mts., Arizona, July 4 (H. G. Hubbard); Mesilla Park, New Mexico, July 8 and Aug. 13 (T. D. A. Cockerell); Texas (coll. Beutenmüller); Sharpsburg, Texas, May 11 (E. A. Schwarz); Glenwood Springs, Colorado (W. Barnes); Nevada.

Genus PSEUDANAPHORA, Walsingham.

Wals., Trans. Ent. Soc, Lond., 1887, 170; *Eutheca*, Grote, Bull. Geog. Surv. Terr., VI., 257, 1881; Dyar, CAN. ENT., XXVII., 15, 1895; *Sapinella*, Kirby, Cat. Lep. Het., 524, 1892.

Synopsis of Species.

Uncus single, long and slender.....*Davisellus.*
Uncus double, two spines projecting from a rounded plate....*arcanella.*

Pseudanaphora Davisellus, Beutenmüller.

Beut., Ent. Amer., III., 139, 1887.

Though described as an Acrolophus, this is obviously referable to Pseudanaphora, from the short erect palpi.

Arizona (Beutenmüller's type); Fort Grant, Arizona, July 20 (H. G. Hubbard).

Pseudanaphora arcanella, Clemens.

Clem., Proc. Acad. Nat. Sci., Phil., 1859, 262; Wals., Trans. Ent. Soc., Lond., 1887, 170 (references); Beut., Ent. Amer., IV., 29, 1888; Forbes, 16th Rept., Ill., 98, 1890; *mora*, Grote, Bull. U. S. Geol. Surv., VI., 257, 1881; Kirby, Cat. Lep. Het., 524, 1892; Dyar, CAN. ENT., XXVII., 15, 1895.

Rhinebeck, New York (Dyar); Rhinebeck, N. Y., July 5 (Miss L. J. Hoff); Fordham, N. Y. (G. Gade); Staten Island, N. Y., June 25 and July 10 (coll. Beutenmüller); District of Columbia, July 18 (coll. C. V. Riley); Washington, D. C., October 10 (A. Busck); St. Louis, Missouri, issued July 3 (C. V. Riley, breeding No. 2563); Texas (coll. Beutenmuller). The specimen taken in October is very dark in colour, blackish, the markings being only faintly indicated.

NEW COCCIDÆ FROM CALIFORNIA.

BY EDW. M. EHRHORN, MOUNTAIN VIEW, CAL.

Xylococcus quercus, n. sp. (Plate 7, figs. 1 and 2.)

Egg quite large, of a light orange colour.

Young larvæ dark orange-red, active, body broadly oval, about $\frac{2}{3}$ mm. long. Legs and antennæ light brown, well developed. Antennæ short, 6-jointed. Joint 1 stoutest, joint 6 longest, and joint 4 shortest. Formula: 651234. Joints 2 and 5 with three bristles. Joint 6 with numerous long stout bristles. Legs moderately long, with femur quite swollen. Tarsus longer than tibia. Digitules of tarsus fine hairs; those of claw long stout clubs curved upwards. Each segment of abdomen bears a backward directed short stout spine. On each side of anal tube is a long fine bristle. Anal tube large, with numerous stout spines. Stigmatal tubes well developed.

♀ second stage, body crimson, shiny, nearly spherical, about $1\frac{1}{2}$ mm. long, 1 mm. broad, surrounded by cottony and waxy secretion. Antennæ and legs wanting. Anal tube well developed, producing a glassy rod, like a stout white hair, rather brittle. Last segment of body dark brown. When cleared in K. H. O., surface of body finely granulated, more so near caudal end. Stigmatal tubes are large and well defined. There are numerous spines and gland openings scattered over the body.

♀ third and fourth stages very similar to second stage, but larger in each case from the preceding, and varying in the further development of stigmatal and anal tubes, glands, spines, etc.

Adult ♀ head, thorax, legs and antennæ reddish-brown, abdomen blackish-brown, segmentation distinct. There is a distinct constriction between the thorax and abdomen. Length of body about $5\frac{1}{2}$ mm., breadth $2\frac{1}{2}$ mm., quite convex above. Ventral side of abdomen concave, with revolute margins. Insect quite active. When ready to

deposit eggs crawls into some crevice and produces a cottony cushion on which it rests and secretes considerable white cotton over its entire body. Antennæ 9-jointed. Joint 1 longest and broadest, next in length is 2, then joint 9 and then 3. Joints 4, 5, 6, 7 and 8 are subequal, and are a little shorter than 3. Formula: 129345678. Legs long and stout. Tibia twice as long as tarsus, both very hairy. Claw long and stout. Digitules fine hairs. Body sparsely covered with long stout spines, especially along the margin and caudal end. Stigmatal tubes very prominent. Anal opening simple and quite large.

♂ larva much like that of ♀, but narrower and more oblong.

♂ second stage not observed.

♂ third stage like that of ♀, but smaller and more elongated.

♂ fourth stage (cast skin) without rostrum. Antennæ 9-jointed. Joints 1 and 9 longest and subequal; joints 7 and 8 subequal; joints 4 and 6 subequal; and joints 2 and 5 subequal. Each joint with long stout hairs. Joint 9 rounded at tip, with several stout hairs and spines. Formula: (19)(78)3(46)(25). Legs long and very stout. Femur much swollen, very little shorter than tibia. Tarsus ½ of tibia. Claw stout and curved. Digitules simple hairs. Body covered with long fine hairs. There are several stout spines on caudal end of abdomen.

♂ pupa, about 2½ mm. long and 1 mm. broad, enveloped in a densely-woven cottony sac about 5 mm. long and 2 mm. broad. Thorax, legs and antennæ light yellow, abdomen crimson. Wing-pads very broad. Legs long and stout. Tarsus ½ as long as tibia. Femur stout and as long as tibia. No claw. Antennæ 9-jointed. Joint 1 stoutest. All joints annulated with white and subequal. Formula: 3.(2.9)4.5.6.7(18).

Adult ♂ about 3 mm. long and 1½ mm. broad, slightly pubescent. Colour of abdomen reddish-brown. Mesothorax black, with four raised knobs. Front part of head black, eyes very prominent, strongly faceted, black. Legs and antennæ black and very hairy. Ventral surface of abdomen dark brown, segmentation distinct. Mesosternum black, a small black line on prosternum, and an irregular black patch on metasternum. Abdominal brushes with long stout glassy bristles about 6 mm. long. Style short, stout and conical. Antennæ 10-jointed, very hairy, reaching beyond end of abdomen. Joint 2 shortest, joints 3 and 10 a little longer, and the other joints subequal. Each joint with numerous hairs. Wings large, about 3 mm. long and 1 mm. broad, expanse about

7 mm., smoky, slightly pubescent, with the costal space blackish-brown. Halteres resembling small wings with several hooks. Legs long, stout and very hairy. Femur much shorter than tibia. Tibia about four times as long as tarsus. Digitules fine hairs. Claw long, slender and well curved. Digitules short club-shaped hairs.

Hab.—I found this remarkable insect in May, 1899, on *Quercus chrysolepis* in Stevens Creek Canon, near Mountain View, Cal., and patiently collected the different stages during the year.

Phenacoccus artemisiæ, n. sp. (Plate 7, fig. 3.)

Adult ♀ elongate oval, about 3 mm. long and 1½ mm. broad, of a sage-green colour. Measuring with egg sac 4½ mm. Sac loosely woven without any grooves, eggs lemon-yellow. Legs and antennæ light brown. Body thinly covered with secretion, but not enough to hide colour of body. Segmentation distinct. When placed in boiling K. H. O., body turns orange colour, and leaves derm colourless after boiling. Antennæ 9-jointed. Joint 2 always longest, joints 5, 6, 7, 8 subequal. Formula: 23914(5678). Joints 1, 7, 8 and 9 with several stout hairs. Legs short and stout. Femur about as long as tibia. Tibia twice as long as tarsus. Claw stout and long, with tooth. Digitules fine knobbed hairs.

Adult ♂. —Abdomen yellowish-green, thorax and head dark green. Thorax marked with black longitudinal lines. Body slightly pruinose. Antennæ and legs light brown. Eyes dark red. Wings more or less pruinose, very delicate. Antennæ very hairy; 10-jointed. Joint 3 longest, joint 1 shortest and stoutest, joints 7, 8 and 10 subequal, joints 2 and 9 subequal. Formula: 3.4 5.6.(7.8.10)(2.9)1. Legs very hairy, long and slender. Tibia much longer than femur. Tarsus very short, less than ¼ of tibia. Claw long and very slender. Digitules fine hairs.

Hab.—On *Artemisia Californica.* Stevens Creek Canon, near Mountain View, Cal. August 22, 1899.

Phenacoccus stachyos, n. sp. (Plate 7, fig. 4.)

Adult ♀ about 2½ mm. long and 1 mm. broad, convex, tapering posteriorly, viviparous, of a sage-green colour. Slightly covered with white secretion, which, when seen through lens, appears as minute white dots. Segmentation distinct. There are two longitudinal rows of light brown dots on the meson. The dorsum and margin are thickly set with long fine iridescent spines, which are deciduous. Legs and antennæ light brown, quite hairy. Caudal filaments short and stout. When placed in

boiling K. H. O., body turns reddish-brown. After boiling, derm becomes colourless, antennæ, mouth-parts and legs remaining light brown. Antennæ long and slender, each joint with a few long fine hairs. Joint 3 longest, next comes joint 2, joints 4 and 5 subequal, joints 1 and 6 subequal, joint 8 shortest. Formula, approximately: 32(45)9(16)78. Legs long and stout, quite hairy. Trochanter with very long bristle. Femur a trifle shorter than tibia. Tarsus about ⅓ of tibia. Claw long and slender, with tooth. Digitules fine knobbed hairs. Lobes well developed, with a long seta, and two long fine bristles. Anal ring with six stout hairs. On each segment of the ventral surface, thorax, and on the head, there are numerous very long fine hairs, and there are numerous short fine spines and numerous spinnerets with club-shaped tubes scattered over the body. Newly-hatched larvæ orange colour, elongate oval. Antennæ 6-jointed, quite stout. Joint 6 longest, twice as long as 4 + 5; joints 1 and 2 subequal, joints 4 and 5 subequal. Formula: 63(12)(45). Legs short and stout. Tarsus as long as tibia. Rostral loup extending beyond last coxæ. Caudal lobes and setæ quite prominent.

Hab.—On *Stachys bullata*. San Francisquito Canon, near Mayfield, Cal. June 28, 1899.

Phenacoccus bahiæ, n. sp. (Plate 7, fig. 5.)

Adult ♀ about 4 mm. long and 3 mm. broad, covered with white cottony secretion, with a distinct ridge of cottony tufts running longitudinally on the meson and two smaller ridges parallel with it. Each ridge has a large tuft at the cephalic end. Margin fringed with short broad cottony appendages, getting longer towards caudal end. Legs and antennæ dark brown. Colour of body is greenish-yellow, with a brown patch on the meson. When boiled in K. H. O., turns crimson at first, then derm becomes colourless, except a row of dark brown patches on the body near and running parallel with the margin. These grow larger caudad. Body is densely covered with round glands and stout conical spines. Anal ring large, with six long stout hairs and numerous stout hairs scattered over area surrounding it. Antennæ and legs remain brown. Antennæ 9-jointed, long and stout. Joint 3 generally longest, then 5, then 9. Joints 1, 2 and 8 generally shortest. All joints quite hairy, and joint 9 quite pointed, with numerous hairs. Formula, approximately: 3.5.9.6.7.4.8.1.2. Legs very long, stout, and thickly covered with very stout hairs. Femur and tibia subequal. Tarsus about

⅓ tibia. Claw very stout and curved, with tooth. Digitules very long fine hairs.

Immature ♂ much like ♀, smaller and lighter colour, about 2½ mm. long, 1½ mm. broad. Legs not as stout. Antennæ 7-jointed. Formula: 372(1456).

Sac of ♂ snow white, more or less irregular in shape, no distinct carinæ, about 4 mm. long, 2 mm. broad.

Pupa.—When removed from sac, cylindrical, shiny. Outline of antennæ, wing-pads and segmentation distinct. Body more or less pitted. Colour greenish-brown, about 2½ mm. long, 1½ mm. broad. Turns dark red when placed in K. H. O.

Adult ♂ measuring, without setæ, about 3 mm. long and 1 mm. broad. Setæ are about twice as long as body, of a snow-white colour. Head and thorax dark brown, abdomen greenish-yellow, slightly covered with white secretion. Head and thorax with numerous stout hairs, abdomen thickly covered with stout hairs. Antennæ very long, stout and very bristly, 10-jointed. Joint 2 shortest, very little shorter than 1. These two joints are about as broad as long, the rest of the joints are sausage-shaped. Joints 3, 4 and 5 subequal and longest. Formula: (3.4.5)6.7.8.9.10.1.2. Legs very long and stout and very hairy. Coxa and trochanter short, latter with very long stout spine. Femur one-fifth shorter than tibia, tarsus ½ of femur. Claw stout, curved, with tooth and double spur. Digitules stout hairs extending as far as tooth. Tarsal digitules fine hairs extending to end of claw. Wings dusky, pubescent, each about 2½ mm. long by 1 mm. broad. Halteres comparatively small, with two stout, well-curved hooks. Style long, stout and conical, forming a blunt hook at caudal end. The last abdominal segment has two groups of round gland openings; on the cephalic margin of each two very long stout spines arise, which run parallel caudad. There are also numerous stout hairs surrounding the glands.

Hab.—On *Bahia*, sp., in foothills near Mayfield, Santa Clara County, Cal. May 7th, 1899.

Dactylopius quercus, n. sp. (Plate 7, fig. 6.)

♀ slightly covered with white secretion, about 2½ mm. long and 1½ mm. broad, tapering at both ends. Colour of body greenish-brown, concealed more or less by secretion. Segmentation very distinct. Each segment bears a white filament on the margin. Caudal setæ about ⅓ as long as body, white and quite stout. Antennæ and legs dark brown.

When placed in boiling K. H. O., body turns crimson, derm becomes colourless after boiling. Antennæ 8-jointed. Joint 8 longest, joint 7 generally shortest. Formula, approximately: 832(15)647. Each joint has a ring of stout hairs. Joint 8 has numerous very long hairs. Legs long and stout, with numerous long fine hairs. Femur about as long as tibia; tarsus about a third as long as tibia; claw slender and well curved. Digitules long fine knobbed hairs. Anal ring small, with six fine hairs. Caudal lobes well developed, with very long setæ (280 μ). Groups of spinnerets, conical spines and long slender hairs scattered over the dorsum.

Hab.—On *Quercus chrysolepis*, on the leaves and in cracks of bark. May, 1899. Stevens Creek Canon, near Mountain View, Cal.

Dactylopius maritimus, n. sp. (Plate 7, fig. 7.)

♀ elongate oval, about 2 mm. long and 1 mm. broad, flattish, slightly covered with secretion. Colour of body, reddish-brown. Margin beset with stout, short, white filaments, which grow longer caudad. Caudal setæ about ½ length of body. Legs and antennæ same colour as body. Eggs orange yellow. Egg sac well developed and has the appearance of *Pulvinaria camellicola*, but smaller—about 5 mm. long and 2 mm. broad.

Young larvæ light orange-yellow.

When boiled in K. H. O., ♀ turns liquid purple and derm becomes colourless. Body thickly beset with long slender spines and many round glands. Each segment has a group of spinnerets on its margin, in the centre of which are two short stout conical spines. Antennæ 8-jointed, quite hairy. Joint 8 always longest, and joint 4 generally shortest, although joint 6 sometimes is shorter than 4; again, joints 4 and 6 are sometimes equal.

The following formulæ will assist in determining the species:

82(13)(57)64.
82(13)5(47)6.
8321(57)64.
81(23)57(46).

Legs quite hairy, well developed, long and slender. Trochanter with long stout spine (128 μ). Femur about as long as tibia. Tarsus about a third as long as tibia. Claw short and stout. Digitules fine knobbed hairs. Caudal lobes prominent, with moderately long setæ and two very stout conical spines. Anal ring large, with 6 very long stout hairs.

Hab.—On *Eriogonum latifolium* roots on the cliffs at Santa Cruz, Cal. July, 1899.

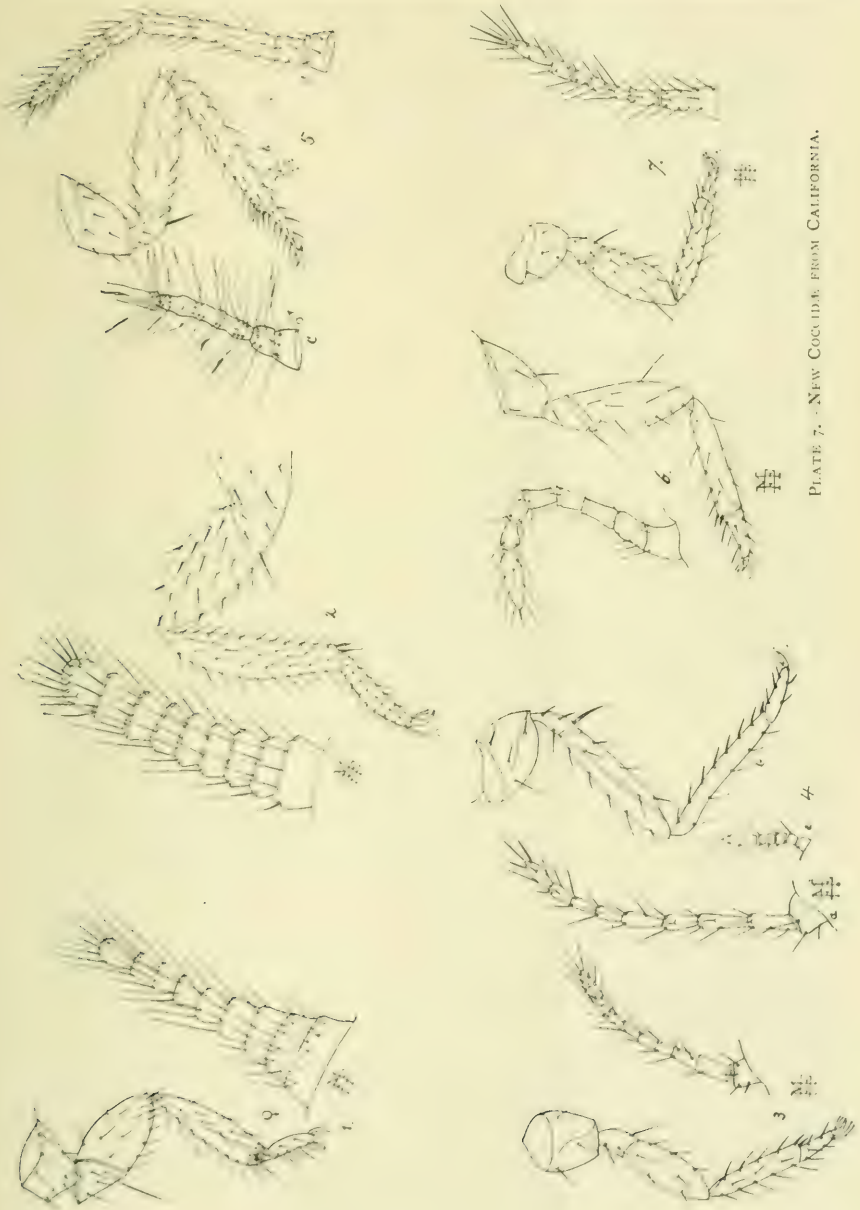

PLATE 7.—NEW COCCIDÆ FROM CALIFORNIA.

EXPLANATION OF PLATE 7.

Fig. 1.—*Xylococcus quercus:* adult ♀ antenna and leg.

Fig. 2.—*Xylo. quercus:* ♂ fourth stage antenna and leg.

Fig. 3.—*Phenacoccus artemisiæ:* adult ♀ antenna and leg.

Fig. 4.—*P. stachyos:* a, antenna; b, leg of adult ♀; c, antenna of larva.

Fig. 5.—*P. bahiæ:* a, antenna; b, leg of adult ♀; c, first 3 joints of antenna of ♂.

Fig. 6.—*Dactylopius quercus:* adult ♀ antenna and leg.

Fig. 7.—*D. maritimus:* adult ♀ antenna and leg.

A QUESTION OF NOMENCLATURE.

The status of Professor French's *Gastrophilus epilepsalis*, described in the September number of this journal, has interested me especially, as I am preparing a new catalogue of North American Diptera.

I am convinced that it was decidedly premature to assign a specific name to this larva In the first place, it was very small and immature, and the earlier larval forms of Oestridæ are much less known than the later, so that we do not possess the data that would enable us to separate this species, for instance, from *G. nasalis*. In fact, I do not think Professor French's description sufficient for the recognition of the same stage of the larva at all, unless the specimens were known to have come from a person affected with epilepsy. It must be remembered that there is every reason to assume the normal habitat of this species of fly to be in some other mammal. Its occurrence in man is in the highest degree unusual. Is it not hopeless, then, to anticipate that specimens taken from their normal host at some future time will be correctly associated with this species? And if such a thing could be, would there not be an incongruity in the name *epilepsalis?*

The name does not deserve a place in a catalogue, unless in a footnote.

J. M. ALDRICH.

Moscow, Ida., September 6.

SUDDEN DISAPPEARANCE OF THE PURSLANE SAWFLY, SCHIZOCERUS ZABRISKEI.

BY F. M. WEBSTER, WOOSTER, OHIO.

On page 54 of the current volume of the CANADIAN ENTOMOLOGIST, I called attention to the sudden and almost total disappearance of this

species at Wooster, Ohio, where it had for several years been excessively abundant, even up to the latter part of August and early September of last year, 1899. This abrupt termination of the period of activity was at the time attributed to the effect of a parasitic species, *Ichneutes*, sp. ?, which had in the meantime become also excessively abundant.

Although the purslane has grown luxuriantly and is unusually abundant this year, so much so that gardeners are complaining bitterly of its abundance and vigour, up to September but a single female *Schizocerus* has been observed, and but a single instance of the work of the larvæ noted, though the writer has searched most carefully for both during the entire season. In fact, it was hoped this year that the full life history of the species might be carefully gone over again and completely studied, but this has unexpectedly been rendered impossible.

BOOK NOTICE.

THE ARGYNNIDS OF NORTH AMERICA.—To Mr. Arthur J. Snyder we are indebted for a paper published in the Occasional Memoirs of the Chicago Entomological Society, Vol. I., No. 1, 1900, on the much-vexed question of the Argynnids of North America.

The author follows Doubleday, Westwood, Edwards, Elwes and others in rejecting the division of the group, made by some systematists, into the two genera, Argynnis and Brenthis, as he considers this division based on "hair-splitting distinctions." In referring to the range of the genus, he is not quite correct in saying that the group is wholly unrepresented in the tropics, as one species, A. Hanningtoni, was collected near Mount Kilimanjaro, in tropical Africa, by the lamented Bishop Hannington, and was dedicated to his memory by Mr. Elwes.

The author states that he "has on several occasions taken the sexes of different species *in coitu*, and from personal observations satisfied himself that the Argynnids are polygamous in their habits," and a little further down he says, "Artonis and Eurynome cohabit, also Eurynome and Clio. The same is undoubtedly true of several other species."

Surely this is a railing accusation to bring against these unfortunate creatures who have never had it explained to them that they are really different species and should behave as such, and certainly shows a sublime faith in the infallibility of the authors who have named these forms as distinct to which the reviewer, possibly because he was born on St. Thomas's day, has never been able to attain.

Probably the facts which Mr. Snyder has observed would suggest to most field naturalists that these slightly differing forms were really only varieties of one species rather than that this particular group of butterflies had lost all sense of decency and propriety, which would be especially shocking in view of one of their number having been named after a bishop, and apparently our author was led to this conclusion in regard to some, at least, of the supposed libertines, as will presently appear.

Mr. Snyder states his opinion that dimorphism occurs among the Argynnids, and believes "that at least two of our so-called species are in reality dimorphic males of species previously described," but he does not give the names of these species, which are all males.

The author thinks that a thorough exploration of the territories where these disputed forms occur will result in revelations that will startle those who have hastily named new species, but is it not a counsel of perfection to urge the student of Argynnids "to secure a large series of species from every locality," for is not every few miles in every direction a separate locality?

Mr. Snyder reduces the number of supposed species from 64 to 57, and increases the number of supposed varieties from 10 to 15, but the only names which he strikes out of the list are Macaria, which he states is a synonym of Eurynome, and Opis, as a synonym of Clio.

Cipris and Alcestis are placed as varieties of Aphrodite and Bischoffi; Artonis and Clio are finally referred as forms of Eurynome.

Arge is listed as distinct, but is said to intergrade with Eurynome.

Electa is erroneously given as Electra.

Mr. Snyder groups the forms in six groups, which he designates as follows:

Diana group, Monticola group, Edwardsii group, Semiramis group, Eurynome group, and Myrina group, the latter embracing all those which have been placed in the genus Brenthis, along with Astarte, Doub.-Hew.

This grouping is followed by notes on the individual forms, but the whole paper shows that much more knowledge is needed before a really satisfactory revision of the very difficult North American forms can be made. H. H. L.

Mailed October 2nd, 1900.

The Canadian Entomologist.

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THE LIFE-HISTORY OF *EUPREPIA CAJA*, L., VAR. *AMERICANA*, HARR.

BY ARTHUR GIBSON, ASSISTANT, DIVISION OF ENTOMOLOGY, CENTRAL EXPERIMENTAL FARM, OTTAWA.

On the evening of the 31st July, 1899, while collecting moths at the electric light, close to the entrance to the Central Experimental Farm, I was fortunate enough to secure a female of *Euprepia Caja*, L., var. *Americana*, Harr. I enclosed her alive in a small box over night, and by the morning she had laid nine eggs. From these eggs five larvæ hatched, and as I have succeeded in bringing two of these through all their stages, my notes may be of interest to some of the readers of the CANADIAN ENTOMOLOGIST.

Egg.—Semi-ovoid, about .75 mm. in width, at widest part; pale yellowish, smooth, shiny.

On the 9th Aug. one egg hatched, on the 10th two more hatched, and by the morning of the 11th the last two had emerged. Before hatching, the black heads of the young larvæ are plainly noticeable, and the egg at this time is a thick milky colour.

Stage I.—Length at rest 2.25 mm., extended 3 mm. General colour creamy white. Head .4 mm. wide, jet black, shiny, rather depressed at apex. Face sparsely covered with minute hairs. On each segment is a transverse row of black tubercles bearing long hairs, those from tubercles on dorsum being black, while those from tubercles on sides are silvery. On 2nd segment in centre of dorsum is one conspicuous black double tubercle almost extending across the dorsum. Thoracic feet black, pro-

legs concolorous, rather translucent. Young larvæ are very active and spin a slight web.

On the 14th Aug. two larvæ passed the first moult, two more on the 15th, and the last one on the 17th Aug.

Stage II.—Length at rest 3 mm., extended 4 mm. General colour dirty whitish-yellow. Head .5 mm. wide, jet black, shiny, very slightly depressed at apex. Face sparsely covered with hairs, which are a little longer than in last moult. On each segment is a transverse row of shiny black tubercles bearing long black and silvery hairs. The large black double tubercle on 2nd segment in centre of dorsum appears as before. Thoracic feet blackish-gray, prolegs slightly darker than body and rather translucent.

On the 19th Aug. one larva passed the 2nd moult, two more on the 20th, and the 4th on the 21st, one larva having died on the 18th Aug.

Stage III.—Length at rest 5.75 mm., extended 6.5 mm. General colour blackish-gray, with a whitish stripe on dorsum, within which is a central ruddy yellowish-red line. Head .7 to .8 mm. wide, jet black, shiny, slightly depressed at apex. A transverse row of irregular shiny jet black tubercles appear on each segment as before, bearing long blackish and silvery hairs. Large double tubercle on 2nd segment in centre of dorsum also as before. On sides of body a stigmatal band occurs, yellowish-white in colour, with a reddish reflection. Thoracic feet shiny, jet black, prolegs concolorous.

On the 24th Aug. three larvæ passed the 3rd moult, and the remaining one on the 25th Aug.

Stage IV.—Length at rest 9 mm., extended 10.5 mm. General colour black, with the front segments rusty. Head 1.0 to 1.1 mm. wide, jet black, shiny, slightly depressed at apex. Transverse row of shiny jet black tubercles on all segments but head; on the 2nd, 3rd, 4th and 5th segments reddish hairs from all tubercles, and also some rather long blackish and silvery hairs. The hairs on the other segments are all blackish and silvery, some much longer than others. Dorsal band, and yellowish-red line centering dorsal band, have entirely disappeared. Stigmatal band interrupted, whitish, tinted with yellow, very faint. Thoracic feet shiny jet black, prolegs black, tipped with dull red.

On the 29th Aug. three larvæ passed the 4th moult, and the remaining one on the 30th Aug.

Stage V.—Length at rest 15.5 mm., extended 18 mm. General

colour black, with front segments rusty, slightly brighter than in last moult. Head 1.5 to 1.6 mm. wide, jet black, shiny, slight furrow on vertex. Transverse row of shiny black tubercles on all segments but head. On the 2nd, 3rd, 4th and 5th segments, as in last moult, reddish hairs from all tubercles, also some black and long silvery hairs. The hairs from tubercles on the other segments are all blackish and silvery, the silvery ones being long and slender; all the tubercles on dorsal area, including a series of which there is one tubercle posterior to each spiracle, have a pearly white patch at summit. This is most conspicuous on the lateral series—*i.e.*, the third from the dorsum. Thoracic feet jet black, prolegs black, tipped with rusty red.

On the 3rd Sept. two larvæ were swollen, and by the morning of the 4th had passed the 5th moult. The remaining two moulted, one on the 5th, and the other on the 6th Sept.

Stage VI.—Length at rest 24 mm., extended 26.5 mm. General appearance a black hairy caterpillar, reddish rust colour on 2nd, 3rd and 4th segments. Head 1.9 to 2.1 mm. wide, jet black, shiny, slight furrow on vertex. Long sweeping silvery white hairs from all tubercles, particularly numerous on segments 5 to 13, inclusive. These segments also bear short white bristles. On segments 2, 3 and 4 the bristles are a rusty red, with only one (or two) long sweeping whitish hair from each tubercle (these rusty red bristles giving the front part of larvæ the reddish appearance). On segment 5 the lateral tubercles also bear a few rusty bristles. All bristles below stigmata on each side fawn coloured (in some specimens almost white). Dorsal series of tubercles black, on segments 5 to 13, inclusive, lateral and stigmatal tubercles whitish. Stigmata white and very small. On segments 2, 3 and 4 the dorsal tubercles are whitish. Thoracic feet and prolegs concolorous, prolegs tipped with a faint rusty tinge.

On the 18th Sept. two had passed the 6th moult, one having died after the 5th moult. The remaining one moulted on the morning of the 20th, but died the same day.

Stage VII.—Length at rest 32 mm., extended 39 mm. General appearance a black caterpillar with rusty red sides, and covered with long sweeping silvery hairs. Head 3.2 to 3.4 mm. wide, jet black, shiny, bilobed. Face sparsely covered with bristles, those about the mouth-parts short and rusty in colour, those from upper part of face fewer and twice as long, and black in colour. On each side of face, on either side

of apex of frontal triangle, there is a small shallow depression. The prominent rusty bristles from dorsal tubercles on segments 2, 3 and 4 have disappeared, with the exception of a transverse patch from tubercles on 2nd segment, which turn down abruptly over the face, and very few on 3rd segment, all the remaining bristles being black. All tubercles whitish. Black bristles and long sweeping silvery white hairs from all tubercles above spiracles. On 2nd and 3rd segments very few silvery hairs; on remaining tubercles of dorsal area on segments 4 to 12, inclusive, about 20, or more, long sweeping silvery hairs. The row of tubercles posterior to spiracles bear long, bright, rusty red bristles from each tubercle, together with a few black bristles from upper half of tubercle, and also a very few long silvery hairs. All bristles below spiracles bright rusty red. Spiracles white. On the 5th and 6th and 11th, 12th and 13th segments are two small blackish medio-ventral tubercles and two sub-ventral tubercles sparsely covered with rusty bristles, the sub-ventral tubercles having more bristles, which are also longer. The medio-ventral tubercles are close together, almost touching each other. Thoracic feet shiny, black, tipped with brownish, prolegs blackish, reddish at ends.

On the 9th Oct. the two remaining larvæ had spun a slight cocoon, and by the 16th Oct. had changed to pupæ.

The cocoon is very thin, made of white, almost cobweb-like silk, with all the long white and some of the other hairs from larva interwoven. Pupa is plainly distinguishable through the cocoon.

Pupa.—Length 27 mm., width at widest part 8.5 mm.; black. Abdomen minutely pitted; thorax and wing-cases wrinkly. Reddish on abdominal folds between segments. Cremaster rough, short but broad, hollowed below, terminating with a bunch of about a dozen and a half short, capitate, rust-red bristles.

On the 16th June, 1900, a single specimen of the mature larva was found at Cumberland, Ont., to which place an excursion of the Ottawa Field-Naturalists' Club was held. The following description was taken: Length 42 mm., extended 50 mm. General appearance, black caterpillar with rust-red sides, rust-red colour on 2nd, 3rd and 4th segments, and covered with long sweeping silvery hairs. Head, width 3.4 mm., jet black, shiny, bilobed. Face sparsely covered with bristles, those about the mouth-parts short and rusty in colour, those from upper part of face fewer and twice as long, and black in colour. On each side

of face on either side of apex of frontal triangle there is a small shallow depression. The skin of body is a beautiful deep black velvety colour. Dorsal tubercles are grayish, with the exception of those on 2nd, 3rd and 4th segments, which are whitish—all other tubercles are whitish. All tubercles above spiracles on segments 5 to 13 bear long silvery hairs from one-half to three-quarters of an inch in length—some tubercles bear as many as twenty silvery hairs. Besides the silvery hairs, these tubercles also bear many black bristles about a quarter of an inch in length. On segment No. 2 the bristles are all reddish, and many hang down over the head. On segment No. 3 the bristles are rust-red, with a very few black ones, and a very few long silvery hairs. On segment No. 4 the tubercles bear hairs and bristles the same as those on the other segments, with the exception that they also bear rust-red bristles in numbers sufficient to give the anterior portion over which these bristles extend a reddish appearance. The row of tubercles posterior to spiracles bear mostly rust-red bristles, but there are also a few black bristles and a few long sweeping silvery hairs. All bristles below spiracles are bright rust-red. Spiracles white. On the 5th and 6th segments and 11th, 12th and 13th segments are two small blackish medio-ventral tubercles and two sub-ventral tubercles bearing sparse rusty bristles, the sub-ventral tubercles having more bristles, which are also longer. The medio-ventral tubercles are close together, almost touching each other. Thoracic feet black, shiny, tipped with brownish, and bearing sparse, short rusty bristles. Abdominal feet and prolegs black, shiny, reddish at ends, and also bearing short rusty bristles.

On the 20th June this larva spun a cocoon and in due course pupated, the moth emerging on the 29th July—length of pupal stage being about 39 days. In the case of this specimen, the cocoon was much darker than in those bred in 1899, this cause being largely due to the additional number of reddish hairs from dorsal tubercles on segments 2, 3 and 4, being interwoven.

The above two descriptions of the mature larva differ slightly in some respects, but this in all probability is due to variations which doubtless occur in the species.

Food Plant.—The larvæ bred in 1899 were fed on lamb's-quarters (*Chenopodium album*). The one taken this year fed on this plant, as also on dandelion and plantain.

NEW SPECIES OF ANAPHORINÆ.

BY HARRISON G. DYAR, WASHINGTON, D. C.

The following apparently new species of Anaphorinæ have been received since the paper published in Can. Ent., XXXII., 307, was prepared :

Genus Atopocera, Walsingham.

Wals., Proc. Zool. Soc., London, 1897, p. 169.

Lord Walsingham would probably not have proposed this name if he had been aware of the previous use of the masculine form of the same term (Atopocerus, Kraatz, Deut. ent. Zeit., XXXII., 360. 1888. However, the different endings will probably sufficiently distinguish the two genera.

Atopocera Barnesii, n. sp.

Palpi recurved to near end of thorax, with head and thorax dark blackish brown ; legs and abdomen dark gray. Antennæ simple, somewhat compressed. Fore wings with costa convex, inner margin slightly excavate before anal angle ; dark brownish gray, violaceous, tinted, mottled, subreticulate with darker brown, and showing faintly a dark rounded discal dot and irregular quadrate patch on the centre of inner margin, extending toward base along median vein. Hind wing uniform dark brown, the base of fringe narrowly lighter. Expanse 20 mm. Male genitalia with uncus double, two well-separated sharp spines, roundedly and but slightly curved toward tip, the opposing lower piece short ; harpes slender, obliquely ascending, curved, uniform, the tip rounded.

One ♂, Kerrville, Texas (Dr. W. Barnes); U. S. Nat. Mus., type No. 5347.

Genus Anaphora, Clemens.

In Can. Ent., XXXII., 309, I placed *Acrolophus violaceellus*, Beut., as a distinct species, but on further comparison I cannot distinguish it from *Anaphora tenuis*, Wals.

Lord Walsingham separates *tenuis* by the presence of short supplementary processes in the ♂ genitalia, but this character is so obscure that I prefer to give the synoptic table in the following form :

Uncus abruptly angulated.

Points of uncus distinctly separated. . . . . *popeanella.*
Points of uncus closely approximate . . . . . *Morrisoni.*
Uncus curved over.
Points of uncus distinctly separate.
Harpes rounded at tip . . . . . *tenuis.*
Harpes oblique below at tip. . . . . *macrogaster.*
Points of uncus closely approximate . . . . . *propinqua.*

Genus NEOLOPHUS, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, p. 141.

Neolophus persimplex, n. sp.

Palpi short, erect, reaching to vertex of head, and closely appressed, densely hairy, slightly tufted on the joints, the third joint smoother. Body robust, in size and appearance resembling *Pseudanaphora davisellus*, Beut., but veins 8 and 9 of fore wings stalked. Antennæ subserrate, especially towards tips. Head and thorax dark gray. Fore wing pale cinerous gray, mottled with black, heaviest in the centre of the wing, the dark area forming a quadrate or pointed patch on the centre of the inner margin, and a diffuse discal patch, becoming merged in the mottlings along costal edge of wing; area along inner margin lighter gray. Hind wings dark gray. Expanse 22 to 24 mm. Male genitalia with the uncus a single long spine tapering from a broad base, obliquely bent downward; harpes broad, concave, strongly widened at tips, rounded, with a slight projection on the terminal margin.

Nine examples; Huachuca Mts., Arizona; July 16 to Aug. 23 (Dr. W. Barnes); U. S. Nat Mus., type No. 5343.

Genus ORTHOLOPHUS, Walsingham.

Synopsis of Species.

Uncus single.
Harpes slender, uniform in width, constricted near tip . . . . *variabilis.*
Harpes broad, spoon-shaped, narrow at base . . . . . *piger.*

Orthalophus piger, n sp.

Palpi erect, reaching above vertex, free from front, rather smoothly scaled. Fore wings light cinerous, slightly violaceous; an ochreous shade over centre of wing, limited inwardly by a black, mottled line from basal third of costa to above centre of inner margin, and outwardly by a similar line from below outer fourth of costa to opposite centre of outer margin,

not reaching either margin. Between these lines the ochreous shade does not reach the costa, and is incised opposite the outer third of inner margin. Wing sparsely irrorate with black, distinctly along costa and in the ochreous shade. A group of dark scales on centre of outer margin. Hind wing blackish, pale along costal edge and extreme base. Expanse 17 mm. Male genitalia with uncus simple, gently curved, broadening toward base; harpes broadly rounded, spoon-shaped, strongly contracted at base, tips evenly rounded.

Three specimens; San Diego, Texas; May 24 to 26 (E. A. Schwarz); U. S. Nat. Mus., type No. 5348.

Genus FELDERIA, Walsingham.

Felderia dorsimacula, n. sp.

Palpi strongly recurved to base of thorax, pale gray before, black outwardly; head and thorax dark gray. Fore wing gray, dark on the costal half, more cinereous along internal margin, mottled with dark brown. A triangular black patch with point on centre of inner margin and the broadest side on the median vein, joined outwardly to a triangular discal patch, that is extended in a curved band nearly to apex, where it becomes obsolete. Hind wings rather light gray, a little darker toward the margin. Expanse 24 to 26 mm. Male genitalia with uncus single, a broad triangular plate, tapering rapidly to a point; harpes slender, rather flat, long, well curved at base, the tips oblique above.

Nine specimens; Huachuca Mts., Arizona; July 24 to Aug. 15 (Dr. W. Barnes); U. S. Nat. Mus., type No. 5346.

THE ACADEMY OF SCIENCE OF ST. LOUIS.

At the first meeting of the autumn, held on the evening of October 15, sixteen persons present, Mr. Wm. H. Roever, of Washington University, presented an elaborate paper discussing in detail the subject of the establishment of the method of least squares. Professor F. E. Nipher presented two papers, entitled respectively Positive Photography, with special reference to eclipse work, and The Frictional Effects of Railway Trains upon the Air; and Mr. C. F. Baker exhibited an interesting collection representing nearly all of the species of fleas thus far known, which he had prepared for the United States National Museum.

Four persons were elected to active membership.

WILLIAM TRELEASE, Recording Secretary.

NEW OR LITTLE KNOWN CALIFORNIAN ORTHOPTERA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

The species here brought together were most of them collected by Mr. A. P. Morse, in the summer of 1897, and as they belong to miscellaneous genera, none of which require special revision, the descriptions are here collected for publication.

Loboptera americana Scudd.

The single original specimen of this species was taken in Arizona, and was apparently collected in alcohol, as two fresh specimens taken by Mr. Morse at Cahon Pass, Cal., July 18, differ in colour and in the shape of the pronotum, requiring its partial re-description. The pronotum is fusco-castaneous, only less obscure than the abdomen, very faintly and delicately mottled with luteo castaneous; it has no mesial constriction (due in the original specimen to contraction in drying), but a regular parabolic curve, and is feebly margined laterally. The tegmina are castaneous, either with the inner half fuscous or with a fuscous median streak. The antennæ are of the length of the body, fusco-luteous, gradually becoming paler distally, very sparsely and delicately verticillate. The legs are uniform luteo-castaneous, the spines concolorous. The form of the whole body is not so oval as indicated in the original figure, but nearly parallel-sided, the abdomen with an independent fullness, and both extremities, but especially the posterior, broadly rounded. The figure also represents the legs as stouter and shorter than they are.

MICROTES, Gen. nov. (*μικρότης*).

Allied to Spharagemon and Tomonotus. Moderately robust, but of small size. Head normal, the summit without carination; fastigium of vertex oval, rather deeply impressed, completely margined with elevated walls; lateral foveolæ triangular, a little elongate, but not reaching the tip of the vertical fastigium; frontal costa not very broad, deeply sulcate, subequal but enlarging below; eyes rather small and prominent; antennæ rather coarse, not tapering, blunt-tipped, in the male only a little longer than the head and pronotum together. Pronotum moderately stout, mesially compressed, the median carina moderately high, cut only by the principal sulcus, the lateral canthi distinct, distinctly cut by the principal sulcus and fading in advance of it, the process of the metazona subrectangulate; interspace between both mesosternal and metasternal lobes distinctly transverse in both sexes.

Tegmina moderately broad, the intercalary vein straight, approximate to the median vein; wings crossed by an extramesial fuscous band, cloudy below the humeral field and in that field sending a tænia nearly to the base. Hind femora rather broad, the inferior carina less elevated than the superior, not very arcuate.

The following single species is known to me:

Microtes nubila, sp. nov.

Fuscous or cinereo-fuscous. Head ferrugineo-fuscous blotched with cinereous, the summit more or less rugulose behind the deep and smooth fastigium; frontal costa deeply sulcate throughout, not or but faintly expanded at the ocellus; antennæ fusco-ferruginous, punctate, considerably less than half as long as the tegmina. Pronotum fuscous or ferrugineo-fuscous blotched with cinereous, the lateral lobes with a small central bright quadrate spot, the disc rugulose or granulate, with no defined direction to the independent rugæ, the median carina moderately high and subequal on the prozona, though somewhat sinuate on a lateral view, gradually lowering on the metazona. Tegmina cinereous, crossed by rather broad, often broken, fuscous bands, a broad basal one, a mesial and a generally shattered extramesial one, the cinereous clouds on either side the median fuscous band hardly crossing the wing, but clear and distinct on the costal border, the whole anal area uniform fusco-cinereous; wings hyaline, weakly tinged with citron basally, the humeral field with a longitudinal fusco-fuliginous stripe occupying the basal half and a similar costal stigma, the anal field feebly infumate beyond the middle, especially in a rather narrow transverse extramesial band, which attains but does not follow the hind margin. Hind femora cinereo-testaceous, four times narrowly and obliquely banded with fuscous; hind tibiæ glaucous, with the base black and a postbasal luteous annulus.

Length of body, ♂, 14.5 mm., ♀, 21 mm.; antennæ, ♂, 6 mm.; tegmina, ♂, 15 mm., ♀, 19.5 mm.; hind femora, ♂, 10 mm., ♀, 13 mm.

4 ♂, 1 ♀. Monterey, Cal., July 16. R. W. Doane (Mus. Leland Stanford Jr. University).

Trimerotropis gratiosa, sp. nov.

Allied to *T. pacifica*. Robust, cinereo-testaceous, rather feebly marked with fuscous. Head as in *T. pacifica*, with rather more pronounced margins of the fastigium of the vertex and more sulcate frontal costa; antennæ testaceous at base, beyond fusco-testaceous,

annulate with fuscous. Pronotum robust, generally uniformly testaceous or cinereo-testaceous, rarely longitudinally striped with fuscous, and then the lower part of the head and lateral lobes are pallid; median carina distinct, percurrent, though the prozona, especially in the female, has a prominent median tuberculous swelling; lateral carinæ sharp and pronounced, even distinct on the prozona; disk of metazona generally plane, sometimes feebly rounded, densely punctate, the process obtusangulate in both sexes; lateral lobes terminating behind in an inferior pointed process, as in *T. pacifica*, but placed more completely at posterior margin. Tegmina, as in *T. pacifica*, but with the markings less pronounced, sometimes almost wholly wanting; hind wings feebly washed with citron in basal half, beyond hyaline, but with the apical veins and cross-veins fuscous (more deeply than in *T. pacifica*) and generally with feeble remains of a transverse mesial fuscous band like that of *T. pacifica*, but never continuous and generally altogether confined to the infuscation of some but not all of the veins and cross-veins of that region, and rarely shows the added infumation of some of the cells. Hind femora and tibiæ as in *T. pacifica*, the former quite as heavily marked.

Length of body, ♂, 28 mm., ♀, 35 mm.; antennæ, ♂, 15 mm., ♀, 13.5 mm.; tegmina, ♂, 26.75 mm., ♀, 31.5 mm.; hind femora, ♂, 15.5 mm., ♀, 18.5 mm.

6 ♂, 6 ♀. Ceres, Cal., Aug. 17. A. P. Morse.

This species differs from *T. pacifica* by its more widely angled pronotal process, robuster and more angulate pronotum, the protuberance of the prozonal disk, and the almost complete, sometimes complete, absence of a band on the hind wings.

Dichopetala brevicauda, sp. nov.

Pale testaceous, the upper surface of head and pronotum tinged with flavous, which terminates on the posterior part of the pronotum at a rectangular bent line of reddish points, its angle at the posterior margin; lateral lobes obscurely marked with fuscous. Pronotum constricted just behind the front margin, emarginate posteriorly next the lower margin of the tegmina; these are testaceous, overlapping, about as long as broad, not truncate, but angulate. All the legs, but especially the hind pair, very long uniform testaceous. Ovipositor no longer than the pronotum, both margins serrate on distal half, besides which the sides of both valves of the same portion bristle with raised rufofuscous serrations, arranged linearly and gradually fading baseward.

Length of body, 15 mm; antennæ, 43 mm.; pronotum, 4 mm.; fore femora, 9 mm.; hind femora, 22 mm.; ovipositor, 4 mm.

1 ♀. Cahon Pass, Cal., July 18. A. P. Morse.

This species differs distinctly from the species heretofore known in the brevity of the ovipositor, and the overlapping of the female tegmina.

Arethæa consuetipes, sp. nov.

Green, the pronotum sometimes testaceous, the basal half of the male tympanum testaceous, but without other markings. Tegmina just surpassing the hind femora, the radial vein sending five or six branches to the posterior margin; tympanum of male tegmina produced, lanceolate, as long behind the transverse vein as in front of it, rounded at tip; legs shorter than common in the genus, the fore and middle femora rectangularly produced at tip.

Length of body, 16 mm.; pronotum, 4.75 mm.; tegmina, 25 mm.; wings, 29.5 mm.; hind femora, 21 mm.

2 ♂. Indio, Cal., July 9. A. P. Morse.

This species differs markedly from the others in the relative brevity of the hind legs. The pronotum lacks the selliform aspect found in the other species, and this species should perhaps be generically distinguished from them.

Clinopleura flavomarginata, sp. nov.

Testaceous or fusco-testaceous, marked and sculptured quite as in *C. melanopleura*, but with the infuscation of the lateral lobes of the pronotum either wanting or much less pronounced, and the lateral carinæ of the pronotum, if anything, less distant. The legs, and especially the hind legs, are longer (the hind femora longer than the body), and the anal appendages of the male differ in that the cerci have a much shorter incurved apical hook, much shorter than the body of the cerci themselves, and the infragenital plate is apically truncate and not emarginate.

Length of body, ♂, 23 mm., ♀, 25.5 mm.; pronotum, ♂ ♀, 6.75 mm.; hind femora, ♂, 25.5 mm., ♀, 26.5 mm.; ovipositor, 19 mm.

5 ♂, 6 ♀. Ahwanee, Aug. 15; Ceres, Aug. 17; and Raymond, Cal., Aug. 16; A. P. Morse. Calaveras, Cal.; Riley. Other specimens of this species are in the U. S. National Museum.

Specimens of *C. melanopleura* were taken by Mr. Morse at Tehachapi, Cal., Aug. 3.

NOTES ON SOME SPECIES OF ACRONYCTA IN THE BRITISH MUSEUM.

BY JOHN B. SMITH, SC. D., RUTGERS COLLEGE, N. J.

Nothing is more aggravating than to be compelled, soon after completing a monographic work, to make changes in the nomenclature and synonymy; yet this is the purpose of this paper concerning the genus *Acronycta*, which was monographed by Dr. H. G. Dyar and myself in Proc. U. S. Nat. Mus., XXI., pp. 1–194, 1898.

It was explained in the introduction to this paper that, because of its interesting early stages, the late Dr. C. V. Riley had been, for years, accumulating material for a thorough study of *Acronycta;* therefore I had made no effort to become closely familiar with the species. Some time before, Dr. A. G. Butler, of the British Museum, attracted in the same way by the larval difference, had divided the species among several genera, referred to several families; allowing superficial and secondary characters to mislead him, as he has since admitted. In 1886, while arranging the Grote material, Dr. Butler made comparisons with other types in the Museum, the results of which were published in 1887 in "Entomologica Americana."

When, in 1891, I examined the British Museum collections, the species of Acronycta were still scattered among several families, and, 1st, because Dr. Butler had already made comparisons and published results; 2nd, because Dr. Riley had made comparisons, the results of which were not yet published, I decided to make no original notes myself. I called attention to this point in my Catalogue, Bull. 44, U. S. N. M., p. 35, where I accepted nearly all of Mr. Butler's synonymical references.

In 1900 I had another opportunity to examine the British Museum collections, and the results are here given.

Acronycta felina, Grt. Type and one other specimen so labelled. Three examples from Vancouver are different. There are "types" also in the Edwards and Tepper collections, which are much darker than the B. M. type. The latter is quite a light gray, basal streak to place of t. a. line; not furcate at tip. T. p. line distinct. Reniform a dusky lunule. In my revision I have described as the typical form the examples represented in the American collections.

Acronycta lepusculina, Gn. The type of this species is not in the collection. Three distinct forms are grouped under this specific name.

Acronycta insita, Walk. The type is a female, and very much

resembles at first sight the male type of *dactylina*. My identification of this species is correct.

It may not be quite out of place to say that additional material received in 1899 makes it quite certain that the form named, tentatively, *Canadensis*, on p. 57 of the Revision, is really a good species.

Acronycta innotata, Gn. The type is a male.

Acronycta dactylina, Grt. The type is a somewhat crippled male.

Acronycta contacta, Wlk. The type is a female, and Mr. Grote rightly refers it to *Polia*. The reference of *diffusilis* as a synonym is just a little doubtful; a point to which I will recur in a later paper.

Acronycta sperata, Grt. Types male and female are here. There is also an example marked "type" in the Coll. Am. Ent. Soc.

Acronycta tota, Grt. The type is a male.

Acronycta pallidicoma, Grt. The type is a small female.

Acronycta impressa, Wlk., type; *Acronycta fasciata*, Wlk., type; and *Acronycta Verrillii*, Grt., type: these are all the same species, and are what Mr. Grote called *brumosa*. There is also a "type" of *Verrillii* in the collection of the American Entomological Society.

Acronycta distans, Grt. The type is a male.

Acronycta superans, Gn. The type is a poor female.

Acronycta brumosa, Gn., type, is the same as *A. persuasa*, Harv., type, and the same as a male example of *A. longa*, Gn., which is *not* the type. There is nothing to warrant the belief that *longa* was named by Guenée himself, and, as I have shown, the description fits closely to *xyliniformis*. On the other hand, Mr. Butler was correct in uniting *brumosa* and *superans*, and I was wrong in connecting *brumosa* with *subochrea*. It seems likely that there was a mix-up among the larvæ described by Guenée, and that in this case an erroneous adult was placed with a *subochrea* larva.

Acronycta perdita, Grt. The type is a male.

Acronycta extricata, Grt. The type is a male.

Acronycta subochrea, Grt., type. A good species, and not *impleta*, Wlk.

Acronycta impleta, Wlk., type. *Subochrea*, Grt., is not to be associated with this species; but, on the other hand. *luteicoma*, G. & R., is, without question, the same species.

As a result of these notes, *Acronycta brumosa* in the Revision, p. 117, should read *subochrea*, and corresponding corrections should be made whenever the species there described under that name is referred to.

Luteicoma, G. & R., on p. 152, should read *impleta*, Wlk., and further corrections to be made as in preceding instance

Persuasa, Harv., must be replaced by *brumosa*, Gn., and corrections made as before.

Acronycta hamamelis, Gn., type, is a very dark, powdery form, and is the form named *afflicta* by Grote; not at all the species heretofore so named in our collections.

Acronycta afflicta, Grt., not the type; but so named by Mr. Grote, and like the species so recognized in American collections. This is the same as *A. hamamelis*, Gn., which is also the same as *brumosa*, var. *b* of Gn. This will explain why Guenée describes the larva of *brumosa* for *hamamelis*. He had evidently mixed up three species; a very dark form of what we call *hamamelis* being easily confused with *afflicta*. At all events, I cannot find any difference between type specimens of *hamamelis*, Gn.; *brumosa*, var. *b*., Gn., and *afflicta*, Grt. The latter name on p. 127 of the Revision must be replaced by *hamamelis* wherever the species there described is referred to; while *hamamelis*, Gn., on p. 141, is really unnamed, and may be called *inclara*.

Acronycta haesitata, Grt., type. A good species, and not *clarescens*, Gn.

Acronycta clarescens, Gn., type. This is the species which was so named in American collections by Mr. Grote, and Mr. Butler was altogether in error in associating it with *hamamelis (haesitata)*. I was the more ready to accept Mr. Butler's determination because the description does really apply to *haesitata* more nearly than to the species for which it is actually intended. At all events, *haesitata*, Grt., must be restored, and *clarescens*, Gn., must be again transferred to the species so long known as such, and now listed as *pruni*.

Acronycta dentata, Grt., type.

Acronycta increta, Morr. A specimen marked "type" in Mr. Grote's handwriting is in the collection. Associated with it are three examples of *inclara—i.e.*, *hamamelis*, Auct., *nec.* Guenée.

Acronycta dissecta, Grt., type. There is also a type specimen in the collection of the American Entomological Society. The type of *retardata*, Wlk., which has priority, is in the collection of Entomological Society of Ontario.

Acronycta exilis, Grt., type; *A. modica*, Wlk., type. These seem to be alike; but there is perhaps a question. The type of *exilis* is the small, light form, with much yellow in the cell and over the ordinary spots; the type of *modica* is as large as *ovata*, but not so sharply

marked, the secondaries dusky. Four other examples of *modica* are broader winged than *exilis*. Based upon these specimens only, the two names would seem to refer to distinct species; but, in the series before me when I wrote, I failed to find a reliable character to separate them.

Acronycta spinigera, Gn., type; *A. Harveyana*, Grt., type. These are identical. There seems to be no reason for doubting the authenticity of the type label on Guenée's species and, as pointed out in the Revision, the description is thoroughly applicable.

Acronycta ovata, Grt., type. Another type specimen is in the collection of the American Entomological Society.

Acronycta albarufa, Grt., type. The type of *Walkeri*, Andrews, is, I believe, in the possession of Mr. John Akhurst, of Brooklyn.

Acronycta grisea, Wlk., type. The type of *pudorata*, Morr., is in the Tepper collection, now in the possession of the Michigan Agricultural College.

Acronycta lobelia, Gn. The type is a small and not very characteristic specimen without fringes.

Acronycta thoracica, Grt. The type is a female, placed in the collection under the *lobeliæ* label as identical with it; but the species are distinct.

Acronycta paupercula, Grt. The specimen is of the larger form of the species.

Acronycta falcula, Grt., type. Two examples of *grisea* are erroneously associated with this.

Acronycta parallela, Grt., type.

Acronycta quadrata, Grt. The type is a female.

Acronycta connecta, Grt. The type a male.

Acronycta Radcliffei, Harv. Marked "type" in Mr. Grote's handwriting.

Merolonche spinea, Grt. The type is a female. Another example, also labelled "type," is in the Hy. Edwards collection.

Acronycta lanceolaria, Grt., type; *Acronycta insolita*, Grt., type. The former is a good example, the latter a very poor male: *lanceolaria* I had seen at the time of writing the Revision; but *insolita* was then unknown to me. During the winter of 1899-1900, Dr. Dimmock sent me a few specimens from Massachusetts for determination; among them was *insolita*, and, much to my surprise, examples indicating that it was a very dark form of *lanceolaria*. The two extremes are totally unlike—very pale ashen or whitish gray on the one hand, almost black on the other, yet when the black overlay of *insolita* is removed, *lanceolaria* appears and, of an example now in my collection, it is almost impossible to say where it should be placed.

The material is too scant to make the reference positively; but it is a little problem for our New England friends to solve by breeding. The larva has been found by Mr. Kirkland and is described on p. 172 of the Revision. It feeds on Willow, *Comptonia* and *Gaillardia*.

ADDITIONS TO THE WESTERN JASSID FAUNA.

BY E. D. BALL, FORT COLLINS, COLO.

Thamnotettix chiragrica, n. sp.—Form and size of *T. parallela* nearly, superficially resembling *Cicadula punctifrons*, var. *Americana*. Length, 6 mm.; width, very nearly 2 mm.

Vertex twice wider than long, half longer on middle than against eye, disc convex slightly sloping, rounded to the face, front very broad and short, width at base and length about equal, the disc convex. Pronotum a third longer than the vertex, over twice wider than long; elytra long, almost parallel margined to the apex, venation distinct, apical cells short, their bases truncate, the anteapicals long.

Colour: vertex pale greenish yellow, a pair of round black spots on the posterior margin, slightly nearer the eyes than to each other, a pair of larger, quadrate spots between the ocelli and the eyes, face pale yellow, a few dark arcs on upper part of front, the upper bounding pair crescentiform uniting on the tip of the vertex, a pair of black spots above the antennal sockets and a black band margining the eyes below. Pronotum olive, shading to yellowish in front, a pair of approximate median spots on the anterior submargin, a larger pair against the eyes and a pair of dots just inside the latter, on either side, black. Scutellum pale yellow, a pair of round spots on the disc and a larger, triangular pair just within the basal angles, black. Elytra dark fuscous, the veins and margins milk-white in sharp contrast. Below pale yellow; ovipositor and spot on the last segment black.

Genitalia: ultimate ventral segment of the female three times the length of the penultimate, the lateral margin roundingly narrowing, the posterior margin roundingly emarginate, the disc posteriorly striated, the middle half angularly elevated.

Described from a single female from Phœnix, Ariz. This is so distinct and easily-recognized a species that there can be no danger in describing it from the single specimen.

Thamnotettix Osborni, n. sp.—Form and general appearance of *Kennicottii*, but smaller and lighter coloured. Length, 5 mm.; width, 1.25 mm.

Vertex longer and narrower than in *Kennicottii*, less than twice as wide as its middle length, disc convex, evenly rounding to the front; front long and narrow, scarcely narrowing until just at the clypeus, genæ scarcely angled, extending below the loræ.

Colour very similar to *Coquilletti*, vertex and face pale creamy washed with orange, ocelli and an irregular spot on either side the vertex at the base, fulvous. Pronotum pale orange fulvous, a narrow transverse band on the middle. Scutellum yellow, brownish or fuscous triangular spots within the basal angles. Elytra fulvous, the anterior half of the corium subhyaline, veins on clavus and the sutural margin narrowly white, claval suture broadly white, with the band on pronotum forming a long triangle.

Genitalia: ultimate ventral segment of female half longer than penultimate, posterior margin broadly rounding, sharply notched either side of a strap-shaped, produced, median tooth; male valve small, almost concealed beneath the large ultimate segment; plates narrow, triangular, the sides convex at base, nearly straight beyond.

Described from a number of specimens taken at Fort Collins and Wray, Colo., and Kimball, Neb. This species is the western representative of *Kennicottii*, with which it has formerly been confused. It may be distinguished by its smaller size and lighter colour as well as by the distinct genitalia.

Thamnotettix Heidemanni, n. sp.—Form of *Cockerelli* nearly, but smaller, the head broader and blunter. Grayish green sprinkled with blood red dots. Length, 4 mm.; width, 1–1.25 mm.

Vertex very slightly angled in front, twice wider at base than its middle length, transversely depressed posteriorly, passage to the front rounded, ocelli rather distant from the eyes, front parallel margined until below the middle, then regularly narrowing to the clypeus, pronotum scarcely twice the length of the vertex, elytra together wedge-shaped.

Colour: vertex and face pale yellow, sutures and about five short arcs on the front fuscous, pronotum pale olive, the anterior margin lighter, scutellum yellow, and orange spot inside each basal angle. Elytra milky subhyaline with a greenish cast, the black tergum showing through. Whole upper surface and face minutely dotted with blood red.

Genitalia: ultimate ventral segment of the female two and one half times as long as the penultimate, the posterior margin broadly rounding or slightly produced on the middle third; male valve small, rounding, about half the length of the ultimate segment, plates broad at base, almost circularly rounding and then extending as a pair of style like points, pygofers long, tubular, oblique, equalling or exceeding the plates.

Described from eighteen specimens from Cerro Summit and Alder, Colo., both high mountain points.

Thamnotettix Cockerelli, n. sp.—Form and general appearance of *Kennicottii* nearly, with indistinct red mottlings. Length, 5–6 mm.; width, 1.5 mm.

Vertex more than twice wider than long, very little produced in the middle, bluntly angled, with the front transversely depressed behind the middle; face parallel margined to below the antennæ, then narrowing to the nearly parallel-margined clypeus; elytra rather long and strongly appressed behind.

Colour: vertex, face, anterior margin of pronotum and scutellum pale yellow, disc of pronotum and elytra grayish brown with a strong coppery reflection, the whole insect mottled with blood red, veins on elytra light, sutures of front black-lined.

Genitalia: ultimate ventral segment of the female very long, nearly as long as the pygofers, posterior margin broadly and evenly rounding; male valve short, rounding, plates broad at base, evenly rounding to beyond the middle, then produced as acute style-like points, the lateral margin, especially of the points, heavily fringed with stout hairs; a dark line just inside the margin at the base.

Described from numerous specimens from Ward, Rist Canon, Marshall Pass, and Palmer Lake, Colo. Taken from well back in the foothills up to 9,500 ft.

Thamnotettix perexigua, n. sp.—Resembling *Chlorotettix lusoria* and *necopina*, but without the fulvous colour. Length, 8 mm.; width, 2 mm.

Vertex but little longer on middle than at the sides, roundingly angled, transversely depressed across the disc; front broad, only slightly convex in either diameter; clypeus long, slightly constricted in the middle; pronotum with the lateral margins long, humeral margins short; elytra long, strong, scarcely narrowing behind.

Colour: Vertex and face slightly greenish-orange, a spot above and another below each ocellus, a waved line along the anterior margin of the vertex, broken in the middle, fuscous; pronotum with a little more of the green than the vertex; elytra a bright greenish-yellow, subhyaline, showing the dark tergum; below bright yellow.

Genitalia: Male valve very short, one-third the length of the ultimate segment, a blunt tooth in the centre; plates long, compressed, a furrow running obliquely through each one, the part outside the furrow curving up and forming a somewhat boat-shaped organ; at the apex of

each plate is a long filament-like appendage resembling that commonly met in *Scaphoideus*.

Described from a single male specimen from Cuernavaca, Mex. (O. W. B.)

Chlorotettix tunicata, n. sp.—Form and general appearance of *Balli*, vertex as in *galbanata*. Length, 7 mm.; width, 1.25 mm.

Vertex half longer on middle than against eye, twice wider than long, disc convex, front and vertex evenly rounded except at apex, which is slightly conical.

Colour pale green, elytra subhyaline, greenish.

Genitalia: ultimate ventral segment of female half longer than penultimate, lateral angles rounding, posterior margin roundingly emarginate, one-third the depth of the segment, sometimes slightly notched in the middle, either side of which there is a brown cloud; male valve broad, slightly longer than the ultimate segment, obtusely angulate, plates broad at base, roundingly narrowing to a very obtuse, almost truncate, apex, together the shape of a blunt-pointed spoon, convex below with a marginal fringe of coarse spines.

Described from three females and three males from Onaga, Kan. (Crevecouer). This species may be readily separated from any other described by the male plates.

Chlorotettix nudata, n. sp.—Resembling *stolata* in form and colour; the vertex is more angled and the fulvous reflection less prominent. Length, 7.5 mm.; width, nearly 2 mm.

Vertex twice longer on middle than against eye, slightly conically pointed, front shaped as in *lusoria*, loræ long and narrow. Elytra long, slightly flaring in the middle, appressed behind.

Colour: pale green, an orange cast on face and vertex, a slightly brownish or fulvous cast on pronotum and elytra, elytra subhyaline, the nervures indistinct.

Genitalia: ultimate ventral segment of the female very short, scarcely as long as the penultimate segment; posterior margin divided into four lobes by a narrow slit in the middle and a pair of broad, shallow notches a little more than half way towards the sides, the margin thin, the plates visible at the base of the pygofers; male valve narrow, obtusely angular, as long as the ultimate segment, plates broad at base, three times the length of the valve, gradually narrowing to the acute slightly produced tips.

Described from one female and one male from Ames, Iowa. Readily separated from any of the species with angled vertices by the genitalia.

Cholorotettix stolata, n. sp. -Form and general appearance of *lusoria* slightly narrower and without the mark on the vertex. Length 7–8 mm.; width 1.5 mm. Male slightly smaller.

Vertex nearly flat on disc, rounding anteriorly, one third longer on middle than against eye, twice wider than long, front convex line between vertex and front distinct, ocelli prominent, transparent, distant from eyes; elytra long and very narrow, venation as in *lusoria*, indistinct.

Colour: vertex pale yellow, sometimes with a greenish cast, pronotum olive, the disc with a fulvous cast; elytra hyaline green, with an iridescent fulvous tinge.

Genitalia: ultimate ventral segment of the female very long, truncate posteriorly or very slightly emarginate, the centre with a brown mark; male valve as long as the last ventral segment, the apex rounding, the margin notched at the middle, plates rather narrow at base, rapidly roundingly narrowing to before the middle, then extending as long attenuate finger-like points.

Described from three females and one male from Cimmaron, Col. Taken in a mountain valley. The genitalia of both male and female are very much like those of *unicolor*, while in shape of head and general appearance it is closely allied to *lusoria* and *nudata*.

Lonatura nebulosa, n. sp.—Form and size of *salsura* nearly, resembles *noctivaga*, but with shorter ovipositor and longer elytra. Length, ♀ 3.5 mm., ♂ 3 mm.; width 1.25 mm.

Brachypterous form: vertex slightly convex, one-fourth wider than long, nearly twice longer on middle than against eye, not quite so long as the pronotum; front longer and narrower than in *noctivaga*, resembling *megalopa*; elytra covering all but two segments of abdomen, evenly rounding behind; venation rather weak, not reticulate.

Colour: vertex dirty straw, a pair of large angular black spots back of the point of the vertex, connected outwardly with a pair of slightly smaller round ones just inside the ocelli; back of these is an interrupted transverse brown band, a brownish fuscous spot against each eye, inside of which is an oblique, olive dash; pronotum pale olive and straw, with a pair of brown spots on the anterior margin equidistant from the median line and the eye, elytra subhyaline, the veins on the inner half milky-

white ; abdomen straw colour, with a transverse row of fuscous dots on the middle of each segment, pygofers with a black mark above.

Genitalia : ultimate ventral segment of the female as long as the penultimate, the posterior margin slightly rounding, the disc strongly elevated ; male valve very small, rounding, plates triangularly narrowing half their length, then produced into bluntly-tipped points, the margin fringed with long hairs.

Described from a single pair taken at Fort Collins, Colo. The four large black spots in a row on the margin of the vertex will readily distinguish it from any but *noctivaga*, from which the smaller size, narrower face and longer elytra will at once separate it.

Lonatura noctivaga, n. sp.—Form of *salsura*, but larger. Pale straw colour, with four black spots on the vertex and two on the elytra. Length, ♀ 5.5 mm., ♂ 4 mm. ; width 1.5 mm.

Brachypterous form : vertex slightly obtusely angled, one-fourth wider than long, two-thirds as long against the eye as on middle ; face broad, slightly convex, front almost as broad as long, parallel-margined to the antennæ, then rapidly narrowing, to the long parallel-margined clypeus. Pronotum transverse, scarcely as long as the vertex. Elytra short, obliquely truncate, covering only the first two abdominal segments. Venation obscure, reticulate, especially along the clavus and apical margins of corium.

Colour : vertex creamy white ; a pair of black spots just back of the apex, and a large pair between these and the ocelli, the median line, an oblique dash on either side of the disc, and some irregular marks against the eyes, olive. Pronotum creamy, with four olive stripes. Elytra creamy, or olive, with light veins ; a black spot on the posterior margin, and sometimes another between this and the scutellum. Abdomen creamy, with olive stripes, or dark olive with creamy stripes.

Genitalia : ultimate ventral segment of the female half longer than the penultimate ; lateral margin roundingly narrowing ; posterior margin truncate or slightly emarginate, with a slight, triangular, median tooth ; ovipositor very long, extending beyond the pygofers ; male valve short, rounding ; plates long, acutely triangular, the lateral margins slightly concave, fringed with a single row of stout hairs.

Described from numerous specimens from Stratton, Neb.; Lamar, and Fort Collins, Colo.

Deltocephalus caperatus, n. sp.—Resembling *Weedi*, but with less flaring elytra; anterior half of vertex black, with a white cross upon it. Length 3 mm.; width 1.25 mm.

Vertex slightly obtusely angled, slightly wider than its median length, one-third longer on middle than against eye, rounding to the front with a slightly produced apex; front convex, rather narrow, lateral margins rounding to the broad clypeus, suture between clypeus and front indistinct; elytra rather broad and stout, broadly rounding behind; venation strong, the central anteapical cell divided, outer sector of clavus tied before the middle of the claval suture.

Colour: vertex, posterior half pale yellow, with a fuscous dot against eye, anterior half shining black, with a strong white cross in the middle, the tip of the cross in a round white spot on the apex of the vertex, the lateral arms also ending in round spots; ocelli in white spots, a yellow line against each eye connecting them with the yellow posterior half of the vertex. Pronotum and scutellum olive, with slightly fuscous markings. Elytra olive subhyaline, the veins broadly white, distinct, narrowly fuscous margined. Face black above, with light arcs, lighter below, a dark band along the apex of front, a stripe on the clypeus, which widens apically; sometimes fuscous margins on loræ and genæ.

Genitalia: ultimate ventral segment of the female twice longer than penultimate, the lateral margins strongly emarginate from the base, the lateral angles rounding, posterior margin twice incised, forming three rounding lobes; beneath the ultimate segment, and visible as a triangular lobe at each lateral angle, is a second membrane as in *compactus*.

Described from three females; one each from: Ray, Colo.; Stratton, Neb., and Ames, Iowa. Readily recognized by the white cross in a black field.

Deltocephalus comatus, n. sp.—Form and general appearance of *colonus*, Uhl. Pale green, with dark spots on vertex, pronotum and scutellum. Length 3 mm., width 1 mm.

Vertex slightly wider than long, obtusely angulate before, but little longer on middle than at eye; eyes long and narrow, pronotum longer than vertex; over half its length within the anterior curve; face rather narrow, rounding; genæ narrow, straight beneath the eyes. Elytra slightly longer than abdomen; venation of the weak *nigrifrons* type.

Colour: vertex pale yellow, a pair of large round spots on the anterior margin near the eyes, a small approximate pair at tip, another pair of small

ones against the eyes, just within the posterior angles, and an oblique dash on either side the disc, black. Pronotum olive, becoming yellowish anteriorly, a pair of elongate spots on the anterior margin just within the eyes; an approximate pair of round ones just back of these, and an oblique dash on either side of the disc, before the middle, in line with the inner margin of the eyes, black. Scutellum pale yellow, a large black triangle well within the lateral angles. Elytra pale green, nervures slightly lighter. Front olive fuscous, a few short arcs and a median stripe, which includes the clypeus, light.

Genitalia: ultimate ventral segment of female about half longer than penultimate; lateral angles slightly rounding, the posterior margin elevated in the middle, and sometimes slightly obtusely toothed; male valve large, very obtusely angulate, plates stout, convexly rounding to a blunt tip, fringed with stout spines.

Described from numerous specimens from Orizaba, Yautepec, and other Mexican points. This species and the following are closely related to *colonus* of Uhler, and belong to the *nigrifrons* group. This species may be readily distinguished from any of the others by the heavy black markings on the pronotum.

Deltocephalus sonorus, n. sp.—Form and general appearance of *nigrifrons* nearly, longer and narrower than *comatus*, olive and fuscous, with milky nervures and reflections. Length 3.25 mm., width less than 1 mm.

Vertex and pronotum similar to those of *comatus*, the eyes long and narrow, enclosing over half of the pronotum. Elytra very long and narrow, with a large appendix; venation strong, two cross nervures, the central anteapical cell very long, dumb-bell shaped but not divided, the apical cell beyond this, small, curved, less than half of the size of the third one.

Colour: vertex a pale dirty yellow; four black spots on the anterior margin, the outer pair often larger than the others, farther from eyes than from inner pair; sometimes a fuscous dot against the eye and irregular brownish markings on disc. Pronotum pale olive and yellowish, with five luteous stripes; scutellum with orange spots along the base. Elytra subhyaline, the veins light, sometimes margined with fuscous. Face brownish fuscous, with light arcs on the front, sometimes the lower part of the face light, with the satures and a stripe on the clypeus fuscous.

Genitalia: ultimate ventral segment of the female half longer than

penultimate, posterior margin slightly waved; male valve angulate, plates concavely, acutely pointed.

Described from sixteen examples from Tucson, Ariz. (Dr. Kunze.)

Deltocephalus elimatus, n. sp.—Form of *sonorus*, but still longer and narrower. Golden green, with black spots on the vertex. Length 4 mm.

Vertex short but decidedly angulate, one-fourth wider than long, two-thirds the length of the pronotum, disc sloping, rounding to the front; front rather narrow above, almost straight margined to the broad clypeus. Elytra very long and narrow, Dicraneura-like; venation similar to *sonorus*, but weak, and lacking the second cross nervure.

Colour: vertex pale yellow, a fuscous spot at apex, a pair of round black spots on the margin nearer the eyes than the apex, and a pair of orange marks on the disc. Pronotum golden or greenish, with five luteous lines. Elytra subhyaline greenish, with a golden reflection. Face yellow, a spot below each ocellus and the antennal pits black.

Genitalia: ultimate ventral segment of female rather narrow at the base, then produced into a remarkably long, blunt-tipped, spatulate process, which is curved up along the margin and at tip; male valve rather long, rounding; plates wide at base, enormously elongated, narrowing to a blunt tip, five times the length of the valve.

Described from three specimens from Sante Fe, Mex. (Barrett.)

The remarkable genitalia of both sexes will readily distinguish this species.

Deltocephalus gnarus, n. sp.—Form and general appearance of *minutus*, V. D., nearly, with a longer vertex and front. Black, with a few markings, and the elytra milky white in female. Male darker. Length, ♀ 2.5 mm., ♂ 2.25 mm.; width 8 mm.

Vertex slightly obtusely angled, the margins straight, one-fourth wider at base than long, one-third longer on middle than against eye, as long as pronotum; front rather narrow, one third longer than wide, the margins gently curved. Pronotum strongly transversely wrinkled; elytra a little longer than body: venation weak; two cross nervures present; the outer anteapical cell very small, acuminate anteriorly.

Colour: vertex shining black, circles around the ocelli, a slender line connecting them with the apex, a cross back of the apex, the margin against the eye, and a pair of oblique dashes on posterior disc, approxi-

mate on the margin, light. Pronotum shining black, a row of submarginal spots, sometimes a median line, and the posterior margin narrowly light. Scutellum black, the lateral margin interruptedly light. Elytra subhyaline white, veins milky. Sometimes in the male the disc of the elytra is darkened up, omitting the cross nervures and the apices of the claval veins. Face black, with margins and arcs on the front light.

Genitalia : ultimate ventral segment of the female twice longer than penultimate ; lateral margin roundingly narrowing ; posterior margin truncate, curved around pygofers ; male valve rather large, obtusely angulate ; plates as wide as the valve, roundingly narrowing to the slightly produced, acuminate, points.

Described from eight specimens from Ames, Iowa; taken by the writer on a patch of "dog-hair" Juncus growing on the margin of a pond.

Cicadula potoria, n, sp.—Form and general appearance of *D. gnarus*. Smaller and darker than any other described *Cicadula*. Length, ♀ 2.5 mm., ♂ 2.25 mm.

Vertex nearly right-angled, twice as long on middle as at eye, half wider than long, margin rounding, apex conical, front narrow, wedge-shaped, the margins straight. Pronotum slightly longer than vertex. Elytra considerably longer than the body, obtusely rounding behind. Venation strong, apical cells long, curved, outer branch of first sector obsolete, two anteapical cells.

Colour : female—vertex dark fuscous, the margins, a median line and two dashes on either side, yellow, the posterior dash almost enclosing a round black spot ; front brownish, with fuscous arcs ; lower part of face yellow, with sutures and a stripe on clypeus fuscous. Pronotum and scutellum yellow on margins and fuscous on discs,omitting a yellow longitudinal stripe. Elytra milky subhyaline, sometimes mottled with fuscous on disc. Male—often the same colour and marking as female; sometimes darkened up until all the light markings are gone except a triangle across face above antennæ.

Genitalia : ultimate ventral segment of female short and straight, or slightly waved posteriorly ; pygofers very short and thick ; male valve short, oval ; plates triangular, their apices produced into long, divergent, style-like, upturned processes.

Described from ten specimens taken from Juncus, along with *D. gnarus*, at Ames, Iowa.

Phlepsius fosca, n. sp.—Form of *humidus*, but much smaller. Colour red. Length 5.25 mm., width 1.5 mm.

Vertex flat, very slightly depressed posteriorly; half wider than long, nearly twice longer on middle than against eye; anterior margin thick but foliacious; front narrow, wedge-shaped; clypeus small, linear. Pronotum little longer than the vertex. Elytra moderately stout, compressed behind.

Colour: ground colour pale yellowish olive, but so thickly sprinkled with irregular spots and blotches of blood-red as to give a red appearance to the whole insect, both above and below. The vertex and scutellum have a more decided yellowish cast. The eyes slaty brown. In the light specimens, the red spots are gathered on the nervures of the wings, but in the darker ones the nervures are indistinct.

Genitalia: ultimate ventral segment of the female half longer than the penultimate; the posterior margin roundingly truncate, with the lateral angles rounded off; male valve very small, rounding, almost concealed under the long, ultimate segment; plates broad at base, semicircularly rounding, then produced into long, style-like, attingent points.

Described from two males and one female, from the mountains of Colorado. One specimen each from Alder, North Park, and Dutch George's, on the Poudre.

CHANGE OF PREOCCUPIED NAMES.

(1) *Parasa prasina*, Dyar, Psyche VIII., p. 273, 1898 (Central America), is preoccupied by *Parasa prasina*, Alph., Deut. ent. Zeit., 1895, p. 186 (Western China). The Central American species may be called *Parasa wellesca*.

(2) The genus Callarctia, Leech, Trans. Ent. Soc., Lond., 1899, p. 168 (West China), is preoccupied by Callarctia, Packard, Proc. Ent. Soc., Phil., III., p. 114, 1864 (North America). The Chinese genus may be called Euleechia. HARRISON G. DYAR.

A GENERAL INDEX to the thirty volumes of the Annual Reports of the Entomological Society of Ontario, extending from 1870 to 1899, has been prepared by the Editor of this magazine, and is now in course of publication by the Ontario Department of Agriculture. It will be ready for distribution before the end of the year, and will, no doubt, be of great value to all who have occasion to consult these Reports.

VARIATIONS IN SOME COMMON SPECIES OF BUTTERFLIES.

BY GEO. A. EHRMANN, PITTSBURG, PA.

Papilio asterias, Fabr. Var. *semi-alba*, ♂, nov. var.

On July 31st, 1899, I captured a very interesting form which is out of the ordinary run of the variation which prevails in this species. The size and markings are the same as the normal form, but all the maculations on the primaries are pure white, while the markings on the secondaries are of a deep golden yellow. The under side is the same, but not so conspicuous. Two males in my collection.

Hab.—S. W. Penn'a.

Papilio philenor, Linn. Var. *obsoleta*, ♂, nov. var.

This form has no submarginal spots either on the fore or hind wings on the upper side; the under side of all the wings is the same as the normal form. Two males in my collection.

Hab.—S. W. Penn'a.

Papilio troilus, Linn. Var. *Texanus*, ♂, nov. var.

In this form the light suffusion on the hind wings between the submarginal lunules and the discoidal cell is replaced by a well-decided band of ashen gray; the band is half an inch wide throughout; the submarginal spots, both on the fore and hind wings, are much larger than the general form. Expands 4½ inches. Male in my collection.

Hab.—Houston, Texas.

Limenitis ursula, Fabr. Var. *cerulea*, ♀, nov. var.

The upper side is normal. Under side, on both the fore and hind wings there is a subdiscal band of large bluish spots, very similar to the white bands in both *L. arthemis* and *L. Weidemeyerii*; otherwise it is the same as the regular form. Female in my collection.

Hab.—Charleroi, Penn'a.

Vanessa antiopa, Linn. Var. *grandis*, ♀, nov. var.

The whole space of the upper side, "except the yellow border and the submarginal black bar," is of a rich chocolate brown; the submarginal row of blue spots is wanting and the yellow border is greatly suffused with brown; under side normal. Female, ex. larva, in my collection.

Hab.—S. W. Penn'a.

DESCRIPTION OF A NEW GENUS IN THE APHELININÆ.

BY WILLIAM H. ASHMEAD.

Myiocnema, new genus.

This new genus falls in a table of the genera of the Aphelininæ next to *Encarsia*, Forster, the antennæ being 8-jointed and the club in the female being 2-jointed.

The head is transverse thin antero-posteriorly, the occiput concave, the vertex impressed; the thorax has several long bristly hairs, and the parapsidal furrows are distinct but very delicate, almost invisible; the front wings have a large discoidal cloud beneath the marginal vein as in *Coccophagus orientalis*, Howard, the stigmal vein is distinct, not very short, but still shorter than the marginal vein and a little shorter than the post-marginal, the marginal vein being a little longer than half the length of the submarginal vein. The hind femora are somewhat thickened, subcompressed, their tibiæ armed behind with stiff bristles; all tarsi 5-jointed, the anterior and middle tarsi being longer than their tibiæ; middle tibiæ with one well developed apical spur, the hind tibiæ with two short apical spurs. The abdomen seen from above is subovate, flat, beneath subconvex, the ovipositor hidden.

The only male specimen has lost its antennæ, but otherwise, except in having a much smaller, shorter, oval, depressed abdomen, agrees well with the female.

The genus is readily recognized by the hind tibiæ, in both sexes, being armed with stiff black bristles.

Myiocnema Comperei, new species.

♀ length 1.2 mm. Head and thorax above aeneous black; sides of thorax, coxæ and femora blue-black; antennæ and tegulæ brown; knees of middle legs, anterior tibiæ and all tarsi, except terminal joints, yellowish; tibial spurs white; middle and hind tibiæ fuscous; hind tibiæ in both sexes armed with stiff black bristles. Wings hyaline, with a broad fuscous discoidal band below the marginal vein.

Habitat.—Brisbane, Queensland.

Types.—Cat. No. 5442, U. S. N. M.

Described from 1 ♂ and 7 ♀ specimens, received by Dr. L. O. Howard from Mr. Alex. Craw, and bred in July, 1900, from *Lecanium oleæ*, Bernard, collected by Mr. George Compere, the travelling agent of the California State Board of Horticulture at Brisbane, Queensland.

CORRESPONDENCE.

SIR,—I am glad to note that Mr. H. H. Lyman, in his review of my paper on the Argynnids of North America, sums up the matter so well in his last paragraph, wherein he states that "The whole paper shows that much more knowledge is needed before a satisfactory revision of the very difficult North American forms can be made." That is just what the author thought, and why the paper was not called, or thought to be, a *Revision of the genus Argynnis.*

When first written, it was to be read before the Chicago Entomological Society, to my especial friends who knew of my interest in the genus, and the paper was called "A Contribution to the Better-Knowledge of the genus Argynnis." The author does not want his friends to think that he has yet attempted to completely solve the Argynnis puzzle, and takes this opportunity to say that any satisfactory revision must be accompanied by plates in natural colours, showing both the upper and under side of each species, a work which can only be accomplished successfully at great expense of time and money.

The author is not a believer in the infallibility of those who name species. His collection contains specimens which have been given three different names by three men supposed to know the species of the genus Argynnis, and specimens taken "in coitu" have been called different species by well-versed students of the genus. What was stated as the polygamous habits of the members of the genus was given as partial proof of what the author believes to be a fact, that many so-called species are varieties or hybrids. He did not, however, feel justified, without further proof, in "relegating a number of names to the synonomy."

Reference was made to the polygamous habits simply to make plain the fact that some of the so-called species are freaks, the result of hybridism. Naturalists, especially closet naturalists, who do not consider it worth their time to study specimens alive, may reach dogmatic conclusions which are entirely satisfactory to themselves, yet which are based on study of a few poor specimens, or even a single individual. The past summer has added to the evidence for hybridism. A correspondent in the field wrote me: "Collecting yesterday where Eurynome was rather abundant, in two instances I found a male Eurynome paying court to females of a dark species double its size, or about same size as Aphrodite. If it is usual for Eurynome to form attachments outside of the species, it may account for several allied forms." This writer is a live naturalist,

and as the Irishman said, "Hit the nail right where a great many have missed it before." Better to "give a counsel of perfection" and hit a few facts than to make a collection of Argynnids with only one or two of each species, and imagine one knows all about the genus.

Permit me to repeat, that each collector interested in the final disentanglement of this genus should do all in his power to build up "large series of species from every locality," for the very reason that "every few miles in every direction is a separate locality," and we must know the fauna of many more of these localities before completing the knowledge of the Argynnids.

As to the dimorphic males, there may be more to say some day, or the author's views may prove incorrect. Stranger things than to name varieties of well-known males as new species have been done by those who hasten to place their names (be they bishops, doctors or laymen) after the names of supposed new species.

What I have written is not with any thought of opening up a controversy, or in any sense to express my objection to the reviewer's remarks; but to make more clear my views upon the subject, and prevent possible wrong conceptions concerning the paper reviewed, both as to its aims and contents.

ARTHUR J. SNYDER.

BOOK NOTICE.

A NATURAL HISTORY OF THE BRITISH LEPIDOPTERA, ETC.—By J. W. Tutt, F. E. S. Vol. II. London and Berlin: May, 1900, pp. vi.–584, plates i.–vii.

The second volume of Mr. Tutt's exhaustive work has now appeared, and this continuation merits all the good words which were so freely spent upon the appearance of the first volume. We have first 100 pages devoted to general subjects, such as Metamorphosis in Lepidoptera, and the External Morphology of the Lepidopterous Pupa. And then (pp. 102–434) there is such a full account of the Psychides as has not yet been published. This is the chief characteristic of Mr. Tutt's work, that everything which has been written on a species has been consulted; the original description is given, the synonym is exhaustive, all known and many new biological facts are carefully added. The number of pages devoted to a single species is thus far in excess and the work has so much more value for consultation. With regard to the Psychides, it

seems extraordinary that there should still be so much new and still to be learned about the European members of this difficult group. The author has been careful to give the gist of what has been published in France and Germany, and concludes his study of the British species by a catalogue of the palæarctic Psychides. Thus there is a broad basis to Mr. Tutt's work, which relieves it from all charge of insularity and should commend it at the same time to continental students no less than to those everywhere interested in the subject.

Pages 434 to the close of the volume are given to the commencement of the Lachneides, and this group is very carefully treated, particular attention being given to Dr. Dyar's studies; while on plate vii. a phyletic tree is reproduced from the pen of our American authority. In the Psychides the views of German writers have been chiefly adopted, in the Lachneides the studies of American authors receive very full attention.

It is not possible, within the limits of this notice, to enter into questions of detail. Mr. Tutt has generally quoted all opinions upon the intricate question of generic synonymy. Where these have differed, in any one case, then the matter has been originally enquired into and a conclusion reached. So far as the reviewer is concerned, these conclusions appear generally acceptable. An exception may perhaps be noted in the case of *Eriogaster*, from which *populi* is excluded as a possible type on the ground that it does not agree with the generic diagnosis. But by its inclusion, Germar evidently thought it did. With questions like this, the historical sifting of types should have nothing to do. If we are to argue upon the verbal interpretation and applicability of the earlier generic diagnoses, there will be no end to the discussion. On the other hand, the reviewer is glad to adopt Mr. Tutt's opinion as to the type of *Gastropacha*, which term may be retained for our *Americana*, etc.

To conclude: No general faunal study is known to the reviewer which can compare with Mr. Tutt's in scope and execution. It is greatly to be hoped that the volumes we now have will be followed by others to the completion of the entire work.—A. R. G.

The Annual Meeting of the Entomological Society of Ontario will be held in the rooms of the Society, 429 Wellington Street, London, on Wednesday and Thursday, Nov. 14th and 15th. All members are cordially invited to attend, and are requested to bring with them any rare or interesting specimens that they may have obtained. Donations to the Society's collections will be very welcome.

Mailed November 3rd, 1900.

The Canadian Entomologist.

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REMARKS ON PSOROPHORA CILIATA, WITH NOTES ON ITS EARLY STAGES.

BY L. O. HOWARD.

Psorophora ciliata, Fabr., is the only species of the genus Psorophora known to occur in the United States. It is a widespread species and is known to the writer to occur in Massachusetts, New Jersey, Pennsylvania, District of Columbia, Virginia, Kentucky, Illinois, Florida, Louisiana, Arkansas, Nebraska, Texas and California. It is, however, rare in its northern range and seems to be a lower austral form. It may have a tropical range, but among many mosquitoes received by the writer during the past year from Mexico, Nicaragua and Cuba, this species does not occur. In his "Notes on the Mosquitoes of the United States" (Bulletin 25, New Series, Division of Entomology, U. S. Department of Agriculture), published August 23rd, 1900, the writer calls attention to the fact that Psorophora and Megarhinus have not been studied by investigators engaged in working upon the transfer of Haematamoebæ by mosquitoes, and urges that physicians and bacteriologists in our Southern States pay some attention to the mosquitoes of these genera.

At the time when the bulletin was written nothing was known about the early stages of Psorophora. A large series of living specimens was captured in June of the present year at St. Elmo, Va., by Mr. Pratt, and we expected that we should be able to secure eggs without difficulty and to study the insect in its different stages. The females were placed alive in large battery jars, under conditions which had repeatedly been successful with Culex and Anopheles, but no eggs were deposited. This brought

the writer to the conclusion that either the confined specimens were not impregnated, or that they had already deposited all of their eggs, or that the breeding habits differ from those of the mosquitoes of the other genera mentioned.

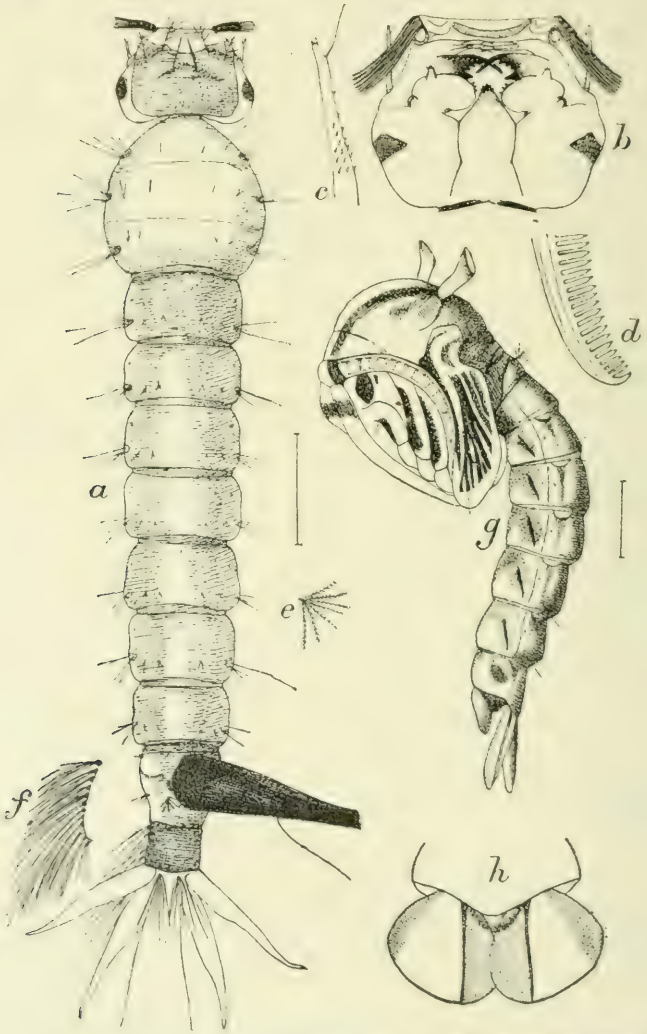

FIG. 31.—*Psorophora ciliata*: *a*, full-grown larva; *b*, head of same from below; *c*, antenna of same; *d*, a mandibular filament; *e*, tuft from penultimate segment of same; *f*, fringe from same; *g*, pupa; *h*, anal flaps of same. Enlarged (original).

On August 30th, 1900, some very large mosquito larvæ and pupæ were received from Mr. Wm. P. Seal, of the Aquarium Supply Company, at Delair, N. J. An examination of these specimens convinced me that they could be nothing else than the larvæ and pupæ of *P. ciliata*. The first specimens received were in alcohol, and Mr. Seal was informed of their probable identity and urged to send on living specimens in water and to endeavor to rear the adult himself. It was then, however, unfortunately, too late. Mr. Seal wrote that during the summer a small creek and some earth ponds on his place became entirely dry, in consequence of which

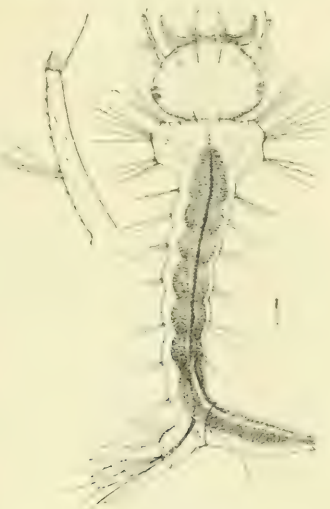

FIG. 32.—*Psorophora ciliata:* young larva with enlarged antenna at left. Enlarged (original).

all fish in them died. Some time in August there was a sufficient rainfall to fill a few of the deepest places, which became almost alive with mosquito larvæ. These were used for fish food until it was noticed that they were developing to the pupa stage, when coal oil was immediately poured on the water. It was when the coal oil was being applied that the big larvæ and pupæ were first noticed. Mr. Seal had been a collecting naturalist for 26 years, supplying material for the aquarium, for biological research, and having discovered some low forms of life new to science, described by Leidy and Ryder; but in all his experience he had never observed such large mosquito larvæ.

On being assured of the novelty and importance of his observation, Mr. Seal promised to watch for the subsequent appearance of similar larvæ, and on September 20th last was able to forward other specimens which appeared after a rain which occurred about the 15th of September or a little before. Mr. Seal was able to distinguish between them and the ordinary Culex larvæ, and wrote that they were very scarce, perhaps one of them to many thousands of the others. On the 25th of September additional larvæ and pupæ were sent by Mr. Seal, and from these specimens the accompanying drawings were made. The larva is structurally of very great interest. On comparison with the larva of Culex, which it resembles more nearly than that of Anopheles, it will be seen that the respiratory siphon is longer, that the anal flaps are longer and more pointed, that the hair fringe on the venter of the anal segment is much longer and denser, and that the mouth-parts differ in very important particulars. The labium is well-differentiated into ligula and paraglossa and the labial palpi are represented by little simple processes. The laciniæ of the maxillæ are beautifully modified into mandibular-like structures, each with a long terminal tooth and stout basal tooth and three intermediate teeth. These not only resemble mandibles, but have a mandibular function, since they are indubitably used in the mastication of food. Other mosquito larvæ studied fed upon spores of algæ and other small particles which appeared to require no mastication, but this larva descends to the bottom of the water and has been noticed to grasp a bit of vegetation a half-inch long and to actually chew it. The maxillary galea is membraneous and furnished with long terminal cilia. The mandibles are long, brush-like organs, each element of which is beautifully pectinate, as shown in Fig. 31 *d*. The clypeus is bent over the front of the head, forming a chitinous overlapping lip which reaches nearly to the maxilla.

The duration of the pupal stage in specimens received was 4 to 5 days, and adults issued on the 27th and 28th of September, and confirmed the determination of the species as *P. ciliata*. In the last sending young larvæ were found, shown at Fig. 32.

The adult of this species is at once distinguished from all other mosquitoes by the peculiar vertical scales on the legs, as shown in the illustration, Fig. 33. The colour of the insect is dark yellowish, with infuscated wings.

The breeding places in which these larvæ were found were small depressions in the bed of a small stream and similar hollows in certain small ponds, all of which were dry the greater part

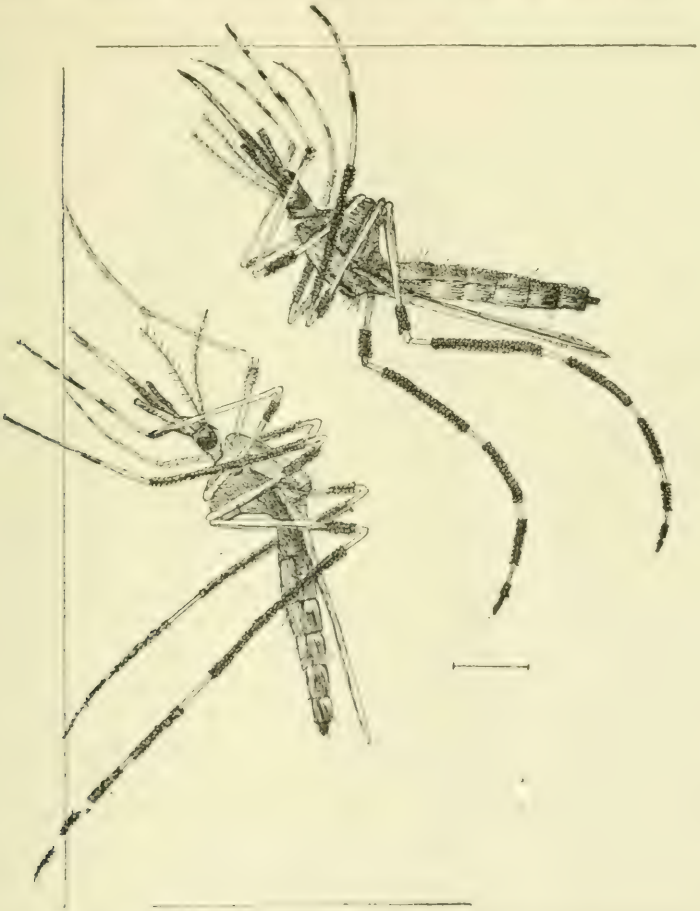

FIG. 33.—*Psorophora ciliata*: adult females, showing resting position on side wall and ceiling. Enlarged (original).

of the past summer. After they first dried in the spring they were barren of fish and vegetation. Mr. Seal is satisfied that the insect is very rare in the vicinity of Philadelphia. It is now important to discover the egg of this interesting species.

NOTES ON *NEOPHASIA TERLOOTII*, BHR., FROM ARIZONA, WITH DESCRIPTION OF A NEW VARIETY.

BY OTTO C. POLING, QUINCY, ILL.

Neophasia Terlootii was described a great many years ago*, and the description being in Latin, it is not surprising that Dr. Strecker overlooked it in the hurry to publish his description of the female I sent him, which he supposed had not been previously described. It is a little surprising, however, that Dr. Skinner, who had the first opportunity to examine one of my examples of *Terlootii*, should have failed to recognize the generic characters of the insect until Dr. Strecker's description as *Neophasia epyaxa* was published.

The first female example of *Terlootii* taken, which is the type of "*Archonias lyceas*, Skinner" †, and is now in my collection, agrees with the type of *Neophasia epyaxa*, Strk., which I sent him after a careful comparison. These two specimens were taken in Cochise County, Arizona, to which locality I sent one of my regular collectors to spend the past season in studying the habits and collecting a series of examples of this interesting butterfly.

Of the series before me, most of the examples agree with the description of *Terlootii* male, and subsequent illustrations and descriptions of specimens sent out. There are, however, three females and one male which differ so much from the others as to well deserve a varietal name, and with the kind permission of my friend, Dr. William Barnes, I am allowed to use a most appropriate name, which he had intended to bestow on the species had it not been previously described, *Neophasia Terlootii*, var. *Princetonia*, n. var. Male differs from type in having the margin of hind wings washed with pale red on both surfaces, of a shade somewhat lighter than that of the female. The under surface is more heavily washed with red than the upper. There is a submarginal entire black band on both surfaces of hind wings, which is not quite so broad as in the female *menapia*, but the veins between this band and the outer margin are more heavily washed with black scales than in the latter species.

Female—From the types of *Neophasia epyaxa*, Strk., and "*Archonias lyceas*," Skinner, this form differs in having a much greater suffusion

*Trans. Am. Ent. Soc., Phil., II., 304 (1869).

†Ent. News, XI., 533, plate XIV. (Sept., 1900).

of black on both surfaces of the wings, and in the absence of the orange spots in outer marginal band of hind wing. There is also a large patch of orange in the centre of the cell.

[The Curator, on behalf of the Entomological Society of Ontario, desires to acknowledge with grateful thanks Mr. Poling's very acceptable gift of specimens of both sexes of this remarkably interesting butterfly—Neophasia Terlootii.]

CLASSIFICATION OF THE BUTTERFLIES.

BY A. R. GROTE, HILDESHEIM, GERMANY.

In the course of my already-published studies, the probabilities as to the homology of the last anal vein of the Papilionides primary have varied. From preparations of the pupal wing of the Hesperiades, it has become clear that the fork to second anal at base is the remains of the third anal vein, which is irregular and more extended in the fore wing of the chrysalis and does not attain the outer margin. It is furcate and connected with the second anal in the pupal stage. On the other hand, the downwardly curved, short, last and free anal vein of the Papilionid primary cannot be homologous with this, as, indeed, I originally contended. This vein reaches the internal margin, and is probably a survival of the fourth anal. This fact points to a different origin for the two groups, which I have finally defined as follows:

A. Butterflies having a short fourth anal vein on primaries, running downwardly free from base of wing to internal margin; on secondaries only one anal vein.....PAPILIONIDES.

B. Butterflies having a short third anal vein on primaries, joining outwardly the second near base of wing (this fork sometimes wanting by reduction and always thinner than second anal or degenerate), fourth anal wanting, and having more than one anal vein on secondaries.....HESPERIADES.

In order to bring out the probable phylogeny in the classification, I accord superfamily value to the two divisions. The Papilionides include the three families: Parnassiidæ, Teinopalpidæ and Papilionidæ, separable on neurational features, the first two appearing as specializations of the last in the order given. The Hesperiades include not only the Lycænids, as indicated by Fabricius, but all the rest of the butterflies, of which I regard the Pierids and Blues as the more recent developments, while the Nymphalids and Skippers represent older types.

A NEW PULVINARIA FROM NEW MEXICO.

BY GEO. B. KING, LAWRENCE, MASS.

Pulvinaria Tinsleyi, n. sp.

Shriveled adult female scales on the twigs, light brown, elliptical, convex. Ovisac, clear white, texture as in *P. innumerabilis*. After boiling in K. O. H., derm colourless, not pitted or tessellate. Legs and anal plates tinged with yellow. Spines of lateral cleft in threes, one long and curved; 76 μ long, two quite short, 28 μ long. Margin with one row of stout blunt spines 40 μ long, 6 broad. Anal plates heart shaped, each 100 μ broad and 136 μ long. Antennæ 7-jointed, width quite constant, but the length of the joints seems to be quite variable. I have examined ten, with the following results in μ: Joint (1) 24 to 40, (2) 40 60, (3) 68–80, (4) 52–64, (5) 28–36, (6) 28–40, (7) 44–52. Formula 3472651. Joint 3 is always longest, while 4 is nearly as long, but never equal; 1 is always the shortest, 5 and 6 are next and sometimes nearly equal. Joints 2 and 3 have two long hairs each; 5 and 6 have 3 each; 7 seems to have 9, the terminal one very long.

Legs normal, with the coxa 80 μ long, 100 broad. Femur with trochanter, 208 long, 68 broad. Tibia, 180 long, 24 broad. Tarsus, 92 long, 20 broad. Claw, 24 long. The trochanter has one short terminal hair. Tibia and tarsus each with four short subterminal hairs. Digitules of tarsus and claw normal, with knobbed ends. No satisfactory measurements can be given of the dead and shriveled adult scales; but those boiled and pressed under a cover glass seem to be nearly circular, about 5 mm. in diameter. *Larva*, just hatched,—yellow, elliptical, marginal spines absent. Antennæ 6-jointed, measuring in μ: (1) 20, (2) 16, (3) 32, (4) 16, (5) 16, (6) 36. Leg, coxa 48. Femur with trochanter, 60. Tibia, 48. Tarsus, 44. Larvæ, perhaps about three or four weeks old, on the leaves of the food plant, have well-developed 7-jointed antennæ, and large blunt marginal spines.

Hab.—On *Celtis* sp., in a draw near the road from Pecacho to Roswell, in the Pecos Valley, New Mexico, about 20–25 miles west of Roswell. Some of the limbs were almost covered with the scales, and many of the leaves were about killed. Collected by Prof. Tinsley, August, 1900, and sent to Prof. Cockerell, who turned it over to me for study. *Pulvinaria innumerabilis* has been recorded from *Celtis occidentalis*, but *innumerabilis* has nothing to do with the species above described, although the two are superficially similar, and might be confused at first sight.

NOTES ON NEW MEXICO BEES.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STATION.

Bombomelecta larreæ, n. sp.

♀.—Length 12½ mm.; general build and structure of *B. thoracica*, but the scutellum is convex with a central depression, and wholly without spines: while the claws have the inner division short and broadly truncate. The maxillary palpi are 6-jointed, and the mandibles have a strong tooth on the inner side. Black; pubescence of the face and vertex pale brown; of the occiput, labrum and clypeus, black; of the pleura, metathorax and scutellum, black; of the post-scutellum, yellowish, especially noticeable at the sides; of the mesothorax, orange-fulvous, short, dense and conspicuous in front, thin behind. Abdomen with broad but inconspicuous ochreous bands on segments 2 to 4, more or less interrupted in the middle on 2 and 4, represented on the first segment by lateral patches, and a few ochreous hairs even in the middle; fifth segment with black hairs. Antennæ entirely black, apex truncate, the corners of the truncation rounded. Legs black, with black pubescence; spurs black, hind spur of hind tibia larger than the other, and somewhat bent. Wings dark fuliginous, with hyaline patches on the third transverso-cubital and second recurrent nervures; venation resembling that of *B. thoracica*, var. *fulvida*, except that the first recurrent nervure joins the second submarginal cell almost at its apex.

Hab.—Mesilla Park, New Mexica, at flowers of *Larrea tridentata*, May 9, 1900.

Epeolus occidentalis, Cresson, var. *segregatus*, n. var.

♂.—Differs from typical *occidentalis* from Colorado, received from Mr. Fox, as follows: Spurs of four hind tibiæ pale brownish, only the minutely ciliate margins black; tegulæ deep orange-ferruginous, shining and distinctly punctured; the two longitudinal pale ochreous stripes on mesothorax narrow, very well defined, not reaching the front margin; marginal cell shorter and broader; wings grayish, not yellowish; light band at apex of first abdominal segment narrowly interrupted in the middle; apical plate of abdomen subtruncate, second and third ventral segments with appressed white hair-bands. The first joint of flagellum is ferruginous beneath.

♀.—Similar to the ♂. Scape and first two joints of flagellum ferruginous beneath; longitudinal stripes on mesothorax subclavate, and attaining the anterior margin; scutellum ferruginous; all the abdominal

bands interrupted in the middle; fifth segment with a pyriform light patch on each side. The last ventral segment is dark, a little hoary in some lights, contrastive strongly with the broadly snow-white hind margins of the three previous segments; apex or abdomen very obtuse, the apical ventral segment not produced.

Distinguished from *E. lunatus* by the transverse black band, instead of semilunar mark, on the first abdominal segment. The lower part of the pleura is free from hair, and sparsely punctured on a shining ground. This insect seems intermediate between *lunatus* and *occidentalis*, and it may be that all three are races of one species.

Hab.—♂. Las Vegas Hot Springs, N. M., July 11. ♀. Las Vegas, at flowers of *Petalostemon candidus*, Aug. 11. (W. Porter.)

Epeolus remigatus, Fabr., var. *Martini*, n. var.

♀.—Length about 14 mm. Head dull from the excessively close punctures; clypeus with some larger punctures interspersed, and a more or less distinct longitudinal raised line; dark mark on mesothorax anchor-shaped, the lateral lobes long; pleura with very little light colour; first segment of abdomen with a broad triangle of black on its disc, the band below the triangle narrowly interrupted; band on second segment very thick, and produced obliquely upwards at the sides, forming an acute angle where it bends; sides of fifth abdominal segment black; antennæ and legs black, tarsi becoming ferruginous, middle tibiæ with a stripe of orange-fulvous pubescence.

Differs from *E. robustus* by the dull, densely punctured clypeus and face, different ornamentation of thorax, band on second abdominal segment bent back at sides, etc.

Differs from *E. concavus* by not having the last ventral segment produced or curved.

Differs from *E. Texanus* v. *nigripes*, by the ornamentation of the thorax and abdomen, and considerably shorter lateral teeth of scutellum. In life the eyes of *Martini* have the upper third green, the rest black.

Hab.—Romersville, N. M., Aug. 6, 1899. (Martin D. Cockerell.) This is very possibly a distinct species.

Epeolus Cressoni, Rob., 1867. New to New Mexico.

Las Vegas, July 24, at flowers of *Sphæralcea Fendleri lobata*, 1 ♂ (Wilmatte Porter); San Ignacio, Sept. 1, Aug. 31, ♀ (W. Porter and Ckll.). A female from near San Ignacio, Aug. 15 (W. Porter), is unusually large, 13 mm. long.

Diadasia diminuta, Cresson.

Santa Fé and Las Vegas, abundant at flowers of Malvaceæ: caught at Las Vegas on *Sphæralcea Fendleri lobata*, *S. cuspidata*, *Malvastrum coccineum*, *M. dissectum* and *Sidalcea neomexicana*, on the last by Mr. A. Garlick.

Diadasia apacha, Cresson.

Mesilla Valley, abundant at flowers of *Sphæralcea Fendleri lobata*. Heretofore recorded as *D. diminuta* (Trans. Am. Ent. Soc., XXV., 193). Its nesting habits are recorded in *Nature*, Sept. 17, 1896, p. 461.

D. diminuta was described from the ♂, *apacha* from the ♀; they are perhaps only subspecifically distinct. The ♀ *diminuta* is distinguished from *apacha* by the dark tegulæ and the thorax broader between the wings; the stigma also averages darker. The *D. diminuta* recorded from Juarez, Mexico (Cat. Abejas de Mexico, p. 14), is *apacha*.

Centris Cockerelli, Fox, Pr. Acad. Nat. Sci. Phila., 1899, p. 68. ♀.

I have little doubt this is the true ♀ of *C. lanosa;* i. e., of the Mesilla Valley insect regarded as *lanosa*.

Centris rhodopus, var. *pulchrior*, n. var.

Mesilla Park, N. M., June 24, one ♂. This is the ♂ variety described by Mr. Fox in Proc. Acad Nat. Sci. Phila., 1899, p. 68, but not named. I think it is probably a distinct species. The legs are ferruginous (the hind femora blackish beneath at base), and the basal joint of the hind tarsi has long white hair like that on the tibia. The hind margins of the abdominal segments have distinct pale hair-bands.

Centris Hoffmanseggiæ, Ckll., Am. Mag. Nat. Hist., April, 1897, p. 395. ♂ (not ♀).

Mr. Fox regarded the insect which I had described as ♀ *C. lanosa* as the true ♀ of *C. Hoffmanseggiæ;* but it differed from the ♂ in its larger size, and entirely different pubescence of the legs, so I thought to treat it as a distinct species. It appears to be fond of the flowers of the mesquite (*Prosopis glandulosa*), on which it was again taken on May 15 of the present year, by Miss Nora Newberry. On May 16, at Mesilla Park, individuals of *Centris* were seen hovering in the air, but not visiting flowers. They were so agile that it was only with considerable difficulty that three were caught. These proved to be males of *C. Hoffmanseggiæ*, but larger (13½–14 mm.) than the single male hitherto known. At the same place, the females, their hind legs covered with orange pollen, were found entering their nests, which were tunnels in the ground, about two

inches vertically, and then laterally about four inches. The female is the insect which I described as ♀ *lanosa*, and thus Mr. Fox's reference of it to *Hoffmanseggiæ* is confirmed.

Panurginus Porteræ, n. sp.

♂.—Length about 7½ mm., black; head and thorax with fairly long, thin whitish pubescence; head transversely suboval; clypeus, except the two black dots, and lateral face marks, lemon yellow; face below antennæ without any conspicuous hair; labrum, mandibles, anterior edge and receding lateral pieces of clypeus (which are hairy) all dark; lateral face-marks triangular, their upper limit barely above the level of the upper edge of the clypeus; antennæ entirely black; front above antennæ cancellate with large punctures; vertex with large punctures, a smooth impunctate area on each side; thorax entirely black; mesothorax and scutellum shining, with well-separated large punctures; legs black, tarsi very dark brown; tegulæ dark brown; wings slightly smoky; nervures and stigma piceous; abdomen rather long and narrow, punctured except the broad hind margins of the segments; apex with two sharp points.

♀.—Stouter; face entirely black; abdomen with very small punctures, extremely sparse on first segment.

Hab.—Beulah, N. M. (Wilmatte Porter). The ♂ was taken Aug. 25, 1899.

From the description, I thought this might very well be a variety of *P. picipes* (Cress.), but Mr. W. J. Fox has kindly sent me a drawing of the face-marks of Cresson's type ♂ of *picipes*, and it is evidently a different species. In *picipes* the lateral face-mark is a small band along the orbital margin, running considerably above the level of the top of the clypeus, and not at all triangular. In my table in Trans. Am. Ent. Soc., XXV., p. 196, the ♂ of *Porteræ* runs to *picipes*. From *P. innuptus* the ♂ is easily known by the triangular lateral face-marks (those of *innuptus* resemble those of *picipes*) and the dark stigma; the ♀ differs from that of *innuptus* by the dark stigma and nervures, the much darker tegulæ, the larger punctures of the mesothorax, the first abdominal segment much more sparsely punctured at the sides, and the black tarsi.

Panurginus Cressoniellus, Ckll. New to New Mexico.

Beulah, N. M., 3 ♀; near Beulah, Aug. 23, 1899, 1 ♂, 3 ♀. All collected by Miss Wilmatte Porter.

ADDITIONS TO THE LIST OF MANITOBA BUTTERFLIES, WITH NOTES ON OTHER SPECIES.

BY A. W. HANHAM, WINNIPEG, MAN.

Euptoieta claudia, Cram.—This species had never even been observed in previous years, but this season appeared plentifully at Bird's Hill in June, and again in August (16th) and September (4th); it was also met with at St. James, just outside the city limits. The species is usually common in prairie districts farther west.

Melitæa Harrisii, Scud.—Taken at Bird's Hill on July 1st, 1899. This season I came across a larva in the act of pupating, but missed the butterflies.

Chionobas alberta.—I captured one specimen at Bird's Hill on May 24th, 1899. This was my first experience with a *Chionobas* "on the wing" up here, and I nearly missed it (being a case of mistaken identity).

Thecla irus, Gdt., and *Thecla augustus*, Kirby.—Bird's Hill, May 24th (and later), 1899, not uncommon. None seen on same date this season.

Thecla titus, Fabr.—One specimen at Bird's Hill this season (August 16); not uncommon at Brandon.

Chrysophanus dione, Scud.—One specimen at Silver Height on July 22nd, 1898. Mr. Boger took a nice lot this season at Brandon.

Lycæna rustica, Edw.—Bird's Hill, June 8th and 10th, 1899, and May 24th this year, fairly plentiful locally. Also taken at Aweme in 1899.

Pieris protodice, Bd.-Lec.—Bird's Hill, this year, in June and September. Though generally common in the West, I have not yet taken this species nearer the city than Bird's Hill.

Pamphila Manitoba, Scud.—Earlier captures were all the var. *Assiniboia*, Lyman; this season on August 16th, at Bird's Hill, I took the typical form in some abundance.

Pamphila hianna, Scud.—Bird's Hill, taken June 8th and 10th, 1899, and one specimen this year on May 24th. It was a plentiful species last June (1899) in the Rounthwaite district.

The season of 1900 opened earlier than usual in Manitoba; on May 24th the early "skippers" and "hair-streaks" appeared to be over; on that date *Lycæna rustica* was out, some being quite worn, and on my next visit in June none were visible. I also took *Lycæna sæpiolus*. Ordinary seasons neither of these "blues" would be on the wing much

before the middle of June, the latter flying into July. *Vanessa Milberti* and *Pyrameis atalanta* and *cardui* were unusually abundant during the spring and early summer.

Argynnis nevadensis, Edw.—I captured my first specimen of this handsome "fritillary" on June 25th at Carberry. Mr. Boger reports it to have been plentiful in June at the Experimental Farm, Brandon. It has not turned up yet at Winnipeg.

Neonympha canthus, Bd.-Lec.—Some I took at Carberry on June 26th appeared to be unusually pale for fresh specimens.

Erebia discoidalis, Kirby, and *Erebia epipsodea*, Butl.—Specimens of both these species have been received from Mr. Dennis, of Beulah, taken there in 1899.

Hipparchia Ridingsii, Edw.—Mr. Norman Criddle, of Aweme, takes this species in his district.

Chionobas varuna, Edw.—In June, 1899, Mr. Marmont, of Rounthwaite, and I took a good series on the slopes and summit of the Brandon Hills, and in the sandy district near Treesbank and that of Aweme it occurred quite plentifully. Some examples of *Alberta* were captured during my visit to his place.

Chionobas jutta, Hbn.—Through the kindness of the Messrs. Criddle and their guidance from Aweme into the Douglas swamp (some 10 or 12 miles), we were able to see this fine butterfly on the wing. The date, June 18th (1899), however, was a little too late, and few of those netted were worth keeping. I think the specimens were somewhat larger and more brightly coloured than those from the Gomin swamp, Quebec.

Pieris napi, Esp.—Early in May "whites" were plentiful in the vicinity of my house, and I supposed that they were *rapæ*, which is our common *Pieris* now. Examining my small boy's captures later on, I was surprised to find that he had been taking the above species, usually a rarity here, and that there was not a single *rapæ* in the lot.

Anthocharis olympia, Edw.—Examples of this species have been taken by Mr. N. Criddle, and by Mr. Robinson, of the Experimental Farm, Brandon.

Colias eurytheme, Bdv.—This season has been noted for the abundance of "oranges"; they have been common from May into October. In 1899, I did not see one the whole season. "Albinos" were plentiful in June; on the 27th at Carberry this form predominated; unfortunately, few were any good.

Pamphila otto, Edw.—I have not met with this species at Winnipeg since my captures in 1895, but it turned up at Brandon this year, having been taken by Mr. Robinson.

Pamphila uncas, Edw.—On June 27th I got three beautifully fresh specimens at Carberry. They were all taken off milkweek. Also captured this year at Brandon by Messrs. Boger and Robinson.

Pyrgus tessellata, Scud.—The previous record was not my capture, and I had never seen the species in the district until this year, when I bagged several at Bird's Hill on June 13th, and at Carberry on the 27th I got two more.

CORRECTIONS.

BY A. RADCLIFFE GROTE, A. M.

To prevent misconception of my paper in the October number of the CANADIAN ENTOMOLOGIST, on the Neuration of Lepidoptera, there should be added to the statement on p. 291, line 2 from bottom of the page, the words: "On the hind wings." The Hesperiades have two anal veins on the secondaries, the Papilionides only one remaining.

Also, at the close of the article, p. 292, the words "of the fore wings" should be intercalated, in the concluding sentence, after "internal vein." I am writing of the last short downwardly curved veins of the Papilionides' primary wing, and which Dr. Chapman regards as homologous with the fourth anal, not the "third," as I have given in the paper. Upon this difference in the appearance and retention of the anal veins of the primaries, I have founded the theory of the diphyletism of the diurnals. The Papilionides will thus have lost the third anal of primaries and retained the fourth, which is free and joins the internal margin. The Hesperiades have generally retained a remnant of the third anal pupal vein, in the shape of a fork to second anal, which is absorbed in many brush-footed butterflies, but is determinate in the Limnadidæ, Libytheidæ and Nemeobiidæ, while the fourth anal of the fore wings has become lost.

I finally would mention that the authorities give Borkhausen as author to *Hydroecia nictitans*, not Linné, as I had written without having consulted the earlier references to the species. The work of Duponchel should be cited: "Lep. Eur.," not "Lep. Ent.," as printed in my last paper on "Types of Noctuid Genera."

SOME CHANGES IN GENERIC NAMES IN THE HYMENOPTERA.

BY WILLIAM H. ASHMEAD.

The following generic names in the Hymenoptera, alphabetically arranged, being preoccupied in other groups of zoology, must be changed, and I propose for them the following names:

Brachycephalus, Förster, 1868, *nec* Holland, 1857, to Brachycranium.

Cacus, Riley, 1893, *nec* Selys, 1854, to Oethecoctonus.

Canidia, Holmgren, 1858, *nec* Thompson, 1857, to Canidiella.

Ceratosoma, Cresson, 1865, *nec* Reeves, 1850, to Ceratogastra.

Clepticus, Haliday, 1839, *nec* Cuvier, 1829, to Mischoxorides.

Colonotus, Forster, 1862, *nec* Peters, 1855, to Protaphidius.

Ecphora, Förster, 1868, *nec* Conrad, 1843, to Ecphoropsis.

Eucorystes, Marshall, 1888, *nec* Sclater, 1883, to Eucorystoides.

Holconotus, Förster, 1862, *nec* Agassiz, 1864, to Aulonotus.

Liogaster, Kriechbaumer, 1890, *nec* Perty, 1834, to Liotryphon.

Limneria, Holmgren, 1888, *nec* Adams, 1857, to Limnerium.

Obba, Tosquinet, 1896, *nec* Beck, 1837, to Tosquinetia.

Ophiodes, Hartig, 1840, *nec* Wagler, 1828, to Ophiogastra.

Thalessa, Holmgren, 1859, *nec* Adams, 1858, to Megarhyssa.

Zarhynchus, Ashmead, 1900, *nec* Oberholzer, 1899, to Rhynchothyreus.

Zetetes, Förster, 1862, *nec* Cabanis, 1859, to Opiellus.

OBITUARY.

DR. OTTO STAUDINGER.

The death of this prominent Lepidopterist is announced as having taken place on October 13, at Lucerne, Switzerland, during a journey undertaken for his health, and at the age of 71 years. Dr. Staudinger's work is well known. It has been given to few to acquire his influence over theoretical and practical workers alike. The new edition of his standard catalogue of palearctic Lepidoptera, upon which the work has been long in hand, has not yet appeared, but may very shortly be expected. In this place we can only express our profound regret at the closing of a long and prosperous career which has greatly benefited the general cause of Entomology.—A. R. G.

REV. G. D. HULST.

We deeply regret to announce the death of the Rev. George Duryea Hulst, Ph. D., which took place suddenly on Monday, Nov. 5th, at his residence, 15 Himrod street, Brooklyn, N. Y. Mr. Hulst was in his fifty-fourth year, and had been pastor of the South Bushwick Reformed Church for over thirty years. In the entomological world he was widely known from his researches in the Lepidoptera, and especially for his work in the Geometridæ, in which family he was recognized as an authority. He was a frequent contributor to the pages of this magazine, and also published elsewhere many elaborate papers on his special department of study. His removal from among us, when in the prime of life, and with apparently many years of useful work before him, will be keenly regretted by systematic entomologists everywhere.

THE LIFE-HISTORY OF *ARCTIA PHALERATA*, HARR.

BY ARTHUR GIBSON, ASSISTANT, DIVISION OF ENTOMOLOGY, CENTRAL EXPERIMENTAL FARM, OTTAWA.

On the 18th June, 1900, Mr. C. T. Hills, of Chicago, was kind enough to send me a batch of about 79 eggs of *Arctia phalerata*, Harr. The parent moth was captured on the 12th June, and enclosed in a box over night; on the next day, the 13th, the eggs were laid.

Egg.—.75 mm. in width, semi-ovoid, about as high as wide, shiny, smooth, creamy-white, concave at base.

The eggs hatched on the 20th and 21st of June. Duration of egg stage 7 or 8 days.

Stage I.—Length 2 mm. General colour dirty cream. Head .3 mm. wide, bilobed, shiny, brownish-black, and bearing sparse slender hairs. On each segment is a transverse row of black tubercles, which appear to occur almost in a line in the middle of the segments. These tubercles bear long black and silvery hairs, and are situated in a light brownish field, which encircles each tubercle. On segments 5 to 12, inclusive, slightly nearer to centre of dorsum, and anterior to larger dorsal tubercles, are two smaller tubercles, which also bear one or two hairs. Thoracic feet and prolegs concolorous.

On the 23rd June the larvæ were swollen, and on the 24th they passed the first moult.

Stage II.—Length 3.5 mm. General colour, some blackish-brown with a light stripe on dorsum, others light brownish with a creamy stripe on dorsum. Head .5 to .6 mm. wide, sparsely covered with short light hairs and long slender dark hairs, bilobed, black at apex and on cheeks; frontal triangle whitish, with a slight tinge of brown. In the darker specimens almost the whole of the head is black. Dorsal tubercles large, with exception of the two anterior tubercles on segments 5 to 12, inclusive, which appear smaller, and are like minute dots. The large dorsal tubercles are now situated in a distinct light brown band. Lateral, stigmatal and ventral tubercles smaller than dorsal series, varying in size from lateral down. Between lateral and stigmatal series of tubercles are brownish blotches, which give the appearance of stripes, or bands. These markings are not so plain on the darker specimens. The bristles from dorsal tubercles are black, with the exception of the small tubercles on segments 5 to 12, inclusive, which bear one or two whitish hairs. Remaining tubercles bear blackish and whitish bristles. Stigmata brown. Thoracic feet and prolegs concolorous, darkened at tips.

On the 27th June most of the larvæ passed the second moult.

Stage III.—Length 5 mm. General appearance blackish hairy larvæ, with a pale yellowish stripe on dorsum, which is almost imperceptible in some specimens. In the majority of the specimens, however, this stripe was plainly distinguishable. Head .8 to 1.0 mm. wide, bilobed, shiny, blownish black, sparsely covered with long blackish hairs; frontal triangle lighter in colour, with dark centre, in some specimens all black. Dorsal tubercles large and shiny black, and bearing black bristles, varying in length, some long and some short. Medio-dorsal tubercles on segments 5 to 12, inclusive, are very small, and bear two or more short white hairs. This series of tubercles almost touches the pale yellowish dorsal stripe. Lateral, stigmatal and remaining tubercles smaller than dorsal tubercles, and bearing black and white bristles. In some specimens the skin of the body is a deep black, with the exception of the dorsal stripe; others are lighter in colour of skin, and have the appearance of two stripes on the sides, but this is due to the black shiny tubercles being more plainly noticeable than the skin. Stigmata dark brown. Thoracic feet concolorous, splashed with shiny black; prolegs concolorous.

On the 1st July a number of larvæ passed the third moult, and by the 3rd all had moulted.

Stage IV.—Length 7.5 mm. General appearance, black hairy larvæ, tubercles very prominent, some specimens having a yellowish dorsal stripe. Of the whole batch of 71 larvæ, the dorsal stripe was only present in seven specimens in the majority of the other specimens just the faintest sign of this stripe was to be seen, while the remainder were perfectly black. Head 1.2 to 1.4 mm. wide, bilobed, shiny, brownish-black, sparsely covered with long blackish hairs. Bristles from dorsal tubercles black, with a few white hairs intermingled. The bristles from the stigmatal and ventral tubercles in this moult are of a light rusty hue, in some specimens much brighter than in others: there are also a few black bristles from these tubercles. The medio-dorsal tubercles on segments 5 to 12, inclusive, are very small and black in colour, bearing two or three bristles each. The dorsal tubercles are very large, and bear numerous black bristles. Stigmata black. Thoracic feet shiny, jet black, covered with short reddish and blackish hairs. Prolegs concolorous, rather translucent, light at tips.

On the 7th July three larvæ passed the fourth moult, and on the 8th the majority of the remainder moulted.

Stage V.—Length 11.5 mm. General appearance, black larvæ with black tubercles, bearing short and long black bristles, with rust-red bristles from tubercles on lower half of sides. Head 1.5 to 1.8 mm. wide, depressed at apex, shiny, black, sparsely covered with short whitish and long blackish hairs. The reddish bristles on dorsum of second segment turn down abruptly over the face, and give it a brownish appearance. The dorsal stripe has disappeared, and is not present in any of the specimens. Bristles from dorsal tubercles black, with a few grayish ones intermingled. On the 12th and 13th segments the dorsal tubercles bear one or two long hairs, black in colour, tipped with gray. The bristles from upper half of stigmatal tubercles are black, those from lower half, as well as all bristles below stigmata, rust-red. Spiracles black, with a light orange centre, with exception of those on 2nd and 12th segments, which are wholly bright orange. Thoracic feet shiny, jet black, covered sparsely with short rust-red bristles; prolegs concolorous, lighter at tips, also bearing short rust-red bristles.

On the 14th July three larvæ passed the fifth moult, and by the 17th nearly all had moulted.

Stage VI.—Length 15 mm. General appearance the same as after the fourth moult: the rust-red bristles on sides and dorsum of second segment appear brighter. Head 2.0 to 2.4 mm. wide, of about the same

size as the body, shiny, jet black, slightly depressed at apex, sparsely covered with slender blackish and silvery hairs, with a number of short light rust-red hairs around the mouth-parts. Bristles from the black tubercles on the dorsum, black. Dorsal tubercles on 12th and 13th segments bear three or four long hairs. Upper half of stigmatal tubercles bear black bristles, lower half rust-red bristles. Bristles from all tubercles beneath spiracles bright rust-red. On dorsum of segment 2 the bristles from front half of tubercles are bright rust-red. These turn down over the face, and give front portion of larvæ a reddish appearance. Spiracles orange, in some specimens faint. Skin of body deep velvety black. Thoracic feet shiny, jet black, sparsely covered with short rust-red bristles. Prolegs, upper two-thirds shiny, jet black; lower third and claspers dull reddish; the whole bearing short rust-red bristles.

On the 23rd July three larvæ passed the sixth moult, and by the 31st all but a few had moulted.

Stage VII.—Length 24 mm. General appearance, velvety black larvæ with black tubercles, bearing short stiff black bristles on dorsum, and bright rust-red bristles from the tubercles below stigmata. In some specimens there is a distinct clear ochre-yellow dorsal stripe, expanded somewhat in the middle of each segment. In others, instead of the dorsal stripe there is a series of elongated spots of the same colour, one on each segment; the number of spots constituting this series varies, some specimens having as many as nine, others only one or two. Head 2.5 to 2.8 mm. wide, slightly smaller than second segment; shiny, jet black, depressed at apex, and sparsely covered with short reddish hairs, and some long slender blackish hairs, the reddish hairs being mostly around the mouth-parts. Base of antennæ and mentum pale. Bristles from dorsal tubercles black. On dorsum of segment 2 the anterior half of tubercles bear rust-red bristles, which turn down over the face. In some specimens the bristles from tubercles on segment 2 are all reddish, with only a few black bristles. Dorsal tubercles on segment 3 also bear some rust-red bristles in some specimens. Medio-dorsal tubercles on segments 5 to 12, inclusive, bear a small bunch of short black bristles. Tubercles on dorsum of segments 12 and 13 bear a few longer black bristles. In some specimens all the dorsal tubercles bear a very few bristles of a dark rusty colour. Lower halves of the stigmatal tubercles bear bright rust-red bristles. All bristles below spiracles, including those from ventral tubercles, are bright rust-red. Tubercle i. small, about one-fifth size of tubercle ii.: tubercles

without shining base. Bristles smooth, not barbed. Stigmata bright orange. Thoracic feet shiny, jet black, dull brownish at tips, and sparsely covered with rust-red bristles, some short and some long. Prolegs, upper two-thirds shiny, jet black; lower third and claspers light rust-red, covered sparsely with short, reddish bristles.

Length of mature larva before spinning cocoon 30 mm., width at widest part 8.5 mm.

On the 20th July one larva passed the sixth moult, and showed the clear ochre-yellow dorsal stripe (rather faint on segments 2, 3 and 13). Another moulted the same day, and in this specimen, instead of the dorsal stripe, occurred a series of elongated ochre-yellow spots, one on each segment, from segment 4 to 12, inclusive. On the 26th July, also, seven more specimens passed the sixth moult, the ochre-yellow varying in these specimens from very faint elongated spots only on one or two segments, to a distinct dorsal stripe, faint on segments 2, 3 and 13. On the 28th one larva moulted, and in this instance the dorsal stripe was distinct, but only present on segments 8 to 12, inclusive. In this, the sixth and last moult, out of the whole batch of 64 larvæ, only 17 specimens showed the ochre-yellow on dorsum; the remaining 47 were perfectly black, and no dorsal stripe or spots whatever were present.

On the 1st August eight specimens began to spin their slight cocoons between the leaves, and on the following day changed to pupæ. In some later specimens it was two days before the pupa was formed, but in the majority of the specimens the change took place the following day.

The cocoon is very thin, and is simply a slight network or web of reddish-brown silk, covering the pupa. The larva draws the leaves of the food-plant together by means of threads of silk, or folds up a leaf, fastening the edges together, and spins its slight cocoon inside.

Pupa.—Length 19 mm., width at widest part 6 mm.; black slightly pruinose, abdomen minutely pitted, thorax and wing-cases slightly wrinkled, dull reddish-brown in folds of abdomen. Cremaster rough and short, rounded above and hollowed below, terminating in a bunch of about 20 capitate bright rust red bristles of varying lengths.

On the morning of the 13th August four female moths emerged, and by the following morning five more females had appeared. During the afternoon of the 14th the first male moth emerged. The moths continued to emerge every day for about a week and a half.

Length of pupal stage about 12 days.

On the 23rd August two live females and one male, all of which had just emerged, were placed out of doors in a cage made of wire cloth, and two days later the females laid a large number of eggs.

On the 2nd September, 80 larvæ hatched, and by the 4th September 35 more had emerged. The description already made of this stage agreed with these specimens.

The larvæ which hatched on the 4th September passed the first moult on the morning of the 9th, and showed no difference from those described in former brood.

On the 12th September one larva passed the second moult, and many others on the following day. These also were the same as the specimens described previously.

On the 17th September a number passed the third moult, the remaining specimens moulting on the 18th and 19th. At this time the number of larvæ living was 85, and in this moult, out of the whole batch, 22 specimens showed the dorsal stripe; in three or four of these specimens the stripe was present on segments 3 to 11, inclusive, but in most of the specimens it was only observable on a few of the middle segments.

On the 25th September a number passed the fourth moult, and by the 28th nearly all had moulted. The larvæ in this moult showed no sign whatever of the dorsal stripe, and the description already given above of this stage answers well for this batch.

On the 4th October some passed the fifth moult, and by the 7th nearly all had moulted. These also corresponded with the description already made. In many of the specimens, however, the rust-red bristles on sides were not so bright or numerous as in the first lot of larvæ.

On the 16th October eight specimens passed the sixth moult. At this time—in fact, a few days earlier—the larvæ were very quiet, and had almost stopped feeding, only a very little frass being found each day in the breeding jars.

On the 18th October four more specimens passed the sixth moult. Of these 12 larvæ, only one specimen showed any sign of a dorsal stripe, and in this case the colour of the stripe was just a little lighter than the velvety black of the skin. The rust-red bristles from sides of these specimens were also not so bright or numerous as those already described. The hairs on the face were mostly blackish, and in some specimens none of the dorsal tubercles bore rust-red bristles.

From the 16th to the 26th October the larvæ had practically stopped feeding, and at this latter date they were put down in a cool cellar, to be left there throughout the winter.

Food-plant.—The larvæ of the first brood were fed on dandelion and plantain, those of the second on dandelion only.

In the Journal of the New York Entomological Society for March, 1900, Dr. Dyar publishes an article entitled "Preliminary Notes on the Larvæ of the Genus Arctia." In this paper some remarks are made regarding the mature larvæ of *Arctia phalerata* and *Arctia vittata*, and it is stated that "the matter is not decided beyond question as to whether *phalerata* or *vittata* has the larva with the dorsal stripe, or whether this is a specific character at all." The notes on the mature larvæ of *phalerata*, as given in the present paper, throw some light upon the matter, and it will be readily seen that the dorsal stripe is not a specific character, as it is present in some mature larvæ, and totally absent in others. This will agree with both Professor French's description and also with the notes of the Department of Agriculture at Washington.

With regard to *vittata*, I might say that on the 26th May last I found a specimen of the mature larva at Ottawa, which spun a very slight cocoon two days later, and produced the moth on the 1st June. This larva was a reddish, hairy caterpillar, with no sign whatever of a dorsal stripe, and not at all like those mentioned above.

The following description was taken from the cast skin and head of larva: Head 3.3 mm. wide, jet black, bearing sparse long slender blackish and reddish hairs, and some short rust-red hairs. Skin of body velvety black, tubercles rough, not polished, bearing bright rust-red bristles, those on dorsum slightly darker. Bristles smooth, not barbed. Tubercle i. about one-fifth size of tubercle ii. Thoracic feet blackish brown, covered sparsely with rust-red bristles.

Pupa.—Length 24 mm., width at widest part 8 mm.; black, pruinose covered with a bloom similar to that on a ripe unrubbed plum; folds of abdominal segments with slight reddish tinge. Abdomen minutely pitted, wing-cases and thorax slightly wrinkled. Cremaster rough, short, rounded above, slightly hollowed beneath, and terminating in a bunch of about 18 capitate rust-red bristles of varying lengths.

From the first brood of *phalerata* 55 moths were bred. In over half of these specimens the costal edge of the primaries is narrowly black, that of the others being yellow. Dr. Dyar, in the above paper, says that the

costal edge of *phalerata* is yellow, and remarks that this may possibly be a distinguishing character between *phalerata* and *nais*, as the costal edge of all his specimens of the latter is black. This, of course, agrees with many of our specimens of *phalerata*, but on account of the black edging being present in the majority of those bred at Ottawa, it would appear that this character is not of specific importance. In about ten female specimens all the yellow markings on the primaries are suffused with the ruddy colour of the secondaries, but there is a remarkable lack of variation in the whole series, both with regard to colour and markings.

I beg gratefully to acknowledge assistance from Dr. Fletcher in confirming my notes in the above investigation, and also to Dr. Dyar for the determination of this species and of the specimen of *A. vittata* referred to above.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The thirty-seventh annual meeting of the Society was held in London on the 13th, 14th and 15th of November. On the first evening a joint meeting with the London Horticultural Society took place in the Normal School, and was very largely attended. Prof. James, Deputy Minister of Agriculture, presided, and gave an interesting address on the beneficial effects of the pursuit of horticulture. Mr. W. E. Saunders read a paper on "The planting, care and pruning of the trees in the parks and streets of the city," and was followed by Dr. James Fletcher, who gave an address, illustrated by lantern pictures, on the growth of trees, and the insect enemies of the flower and fruit garden.

The morning of the 14th was taken up with a business meeting of the Council. In the afternoon the various reports of the Directors, Officers, Branches and Sections were read, and then followed an important discussion on the San José scale in Ontario. Mr. Fisher, the Provincial Inspector, gave an account of the work that had been performed during the year for the repression of the scale, and the results that had been obtained from the use of various remedies. Dr. Fletcher, Prof. Webster (of Ohio), Prof. Lochhead, Mr. Dearness, Dr. Fyles, and others, took part in the discussion. The speakers insisted strongly upon the very dangerous character of this insect, its wide dissemination in several parts of the Province, and the destruction that would be surely wrought among the orchards and fruit plantations if stringent measures were not taken for its subjugation.

In the evening the Rev. Dr. Fyles read his presidential address on "Insects as agents in the cross-fertilization of blossoms," and papers were read by Prof. Webster on the Codling moth, Prof. Lochhead on Forest Insects, and Mr. Gibson on the life-history of Arctia phalerata. The points brought forward by the speakers were discussed with much interest and animation at the close of each paper.

On Thursday a large number of papers were read during the day, which will be published, with a full account of the proceedings, in the forthcoming Annual Report. The election of officers resulted as follows:

President—Rev. T. W. Fyles, D.C.L., F.L.S., South Quebec.

Vice-President—Professor William Lochhead, Ontario Agricultural College, Guelph.

Secretary—William E. Saunders, London.

Treasurer—J. A. Balkwill, London.

Directors: Division No. 1—C. H. Young, Ottawa.
Division No. 2—J. D. Evans, Trenton.
Division No. 3—D. G. Cox, Toronto.
Division No. 4—James Johnson, Bartonville.
Division No. 5—R. W. Rennie, London.

Directors Ex-officio (ex-Presidents of the Society)—Professor Wm. Saunders, LL.D., F.L.S., F.R.S.C., Director of the Experimental Farms, Ottawa; Rev. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., London; James Fletcher, LL.D., F.L.S., F.R.S.C., Dominion Entomologist and Botanist, Experimental Farms, Ottawa; W. H. Harrington, F.R.S.C., Ottawa; John Dearness, Normal School, London; Henry H. Lyman, M.A., Montreal.

Librarian and Curator—J. Alston Moffat, London.

Auditors—J. H. Bowman and W. H. Hamilton, London.

Editor of the Canadian Entomologist—Rev. Dr. Bethune, London.

Editing Committee—Dr. J. Fletcher, Ottawa; H. H. Lyman, Montreal; J. D. Evans, Trenton; W. H. Harrington, Ottawa; Prof. Lochhead, Guelph.

Delegate to the Royal Society—Rev. Dr. Bethune, London.

Delegates to the Western Fair—J. Dearness and Dr. Bethune, London.

Committee on Field Days—Dr. Woolverton, Messrs. Balkwill, Bowman, Elliott, Law, Moffat, Percival, Rennie, and Saunders, London.

Library and Rooms Committee—Messrs. Balkwill, Bethune, Dearness, Moffat, and Saunders, London.

ERRATA.

Vol. XXX., 1898, page 280, line 10 from bottom, for "clavipennis" read "claripennis."—D. W. COQUILLETT.

Page 236, third line from bottom, for *Guaris* read *Gauris*.

Page 320, line 22 from top, for "varieties of Aphrodite and Bischoffi;" read "varieties of Aphrodite, and Bischoffi,".

[Comma after Aphrodite and another after Bischoffi, instead of semicolon.]

NOTE ON *SESIA ARCTICA*, BEUTEN.

BY WM. BEUTENMULLER.

In advance of my forthcoming memoir of the Sesiidæ, I published in the current volume of the CANADIAN ENTOMOLOGIST, page 208, a description of a new *Sesia* from Alaska, but through a curious blunder on my part omitted to mention the name of the species, and herewith propose to call it *Sesia arctica*.

Mailed December 10, 1900.

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